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# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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# Baird Tumblers For All Purposes

Single Oblique Cast Barrel

Japanning Barrel

Baird-Warner

ALL TYPES OF MACHINES—oblique tilting, horizontal, exhaust, non-exhaust, single, double, four-barrel, steam drying, japanning, ball burnishing.

EVERY TYPE OF BARREL—cast brass, cast iron, sheet brass, sheet iron, sheet copper, wood, cast iron with wood lining, wood barrel with metal lining, wood barrel with metal bottom or any other variation or combination of material. Barrels may be round, octagonal, four or eight sided, long or short, wide or narrow. They may be smooth inside or fitted with fins, or steps, or any one of many arrangements to effect the movement of work inside the barrel. There may be covers, or sieves, or divisions, special methods of heating or cooling or applying water, loading or unloading.

DESCRIPTIONS OF VARIOUS TYPES OF TUMBLERS ARE GIVEN IN BULLETINS 300, 301, 302, 303 AND 309. THEY WILL BE SENT ON REQUEST.

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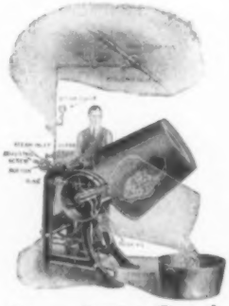

Steam Drying Barrel

Ball Burnishing Barrel

Single Horizontal Grinding

Heavy Back Geared Grinding

THE
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Vol. 21 NEW YORK, FEBRUARY, 1923 No. 2

## A New Zinc-Base Die-Casting Alloy

### A Zinc-Base Alloy Which Is Non-Corrosive and Does Not Swell Up or Warp

Written for The Metal Industry by CHARLES PACK, Vice-President and Chief Metallurgist, Doehler Die Casting Company, Brooklyn, N. Y.

The use of die-castings has increased so rapidly during the past ten years that the subject of die-casting alloys has been receiving the careful attention of metallurgists both in this country and abroad. Where it has been customary heretofore to purchase "die-castings" without any descriptive qualifications, it is now general practice to specify the composition of the "die-casting" as carefully as that of any other metallurgical product.

It has long been recognized that some die-castings are subject to swelling, warping and deterioration in service. Such die-castings have been used indiscriminately with disastrous results, creating, in the minds of some engineers, a natural prejudice against all die-cast products. This prejudice is unfair to the die-casting industry, since it has been repeatedly demonstrated that the deterioration encountered in some die-castings is positively attributable to the alloy used in that particular casting and not to the die-casting process.

There is no element in the well-regulated die-casting process that would tend to cause deterioration of the product. Furthermore, the alloys used in die-castings that show this deterioration would show a similar phenomenon if the alloy were used in sand molds or if it were rolled or forged. To say, therefore, that die-castings deteriorate is false and misleading. Tin-base die-castings have been used in vital parts of automotive engines for the past twenty years, and it has been demonstrated conclusively that the same tin alloy when die-cast has better physical properties than when cast by any other method. Many tin-base die-castings have been used for the past twenty years in pianos, organs, fruit juice and soda dispensers, surgical instruments, electrical instruments, etc., and not one case of deterioration has been discovered. Similarly, lead-base die-castings have been under severe corrosive service conditions with entire satisfaction.

In the nine years that the aluminum die-casting has been on the market its use has become almost universal and no record of warping and swelling of an aluminum-base die-casting has ever come to our attention. The superiority of the aluminum-base die-casting over the aluminum-base sand-casting is universally admitted.

During the war millions of aluminum die-castings were used in the manufacture of gas-masks for our army. The failure of these die-cast parts in service would have jeopardized the safety and very lives of our troops. Die-cast aluminum binocular housings were used to retain the lenses to a degree of accuracy measured in ten thousandths parts of an inch. The slightest tendency of the die-casting to warp or distort would have made these binoculars inoperative. Aluminum die-castings formed a vital part of the manufacture of Lewis Machine Guns, admitted to be the most useful offensive and defensive weapon used in the war.

Every case of deterioration of die-castings brought to our attention has been limited to die-castings made from zinc-base alloys. The subject of the deterioration of zinc-base alloys has received the attention of many metallurgists during the past ten years. Williams (Transaction American Institute of Metals, 1917) describes some experiences of the National Cash Register Company with the swelling of zinc-base die-castings and refers to a rapid test for determining the comparative rate of such swelling. Pierce & Palmerton (Transaction American Institute of Mining and Metallurgical Engines, February, 1922) have done

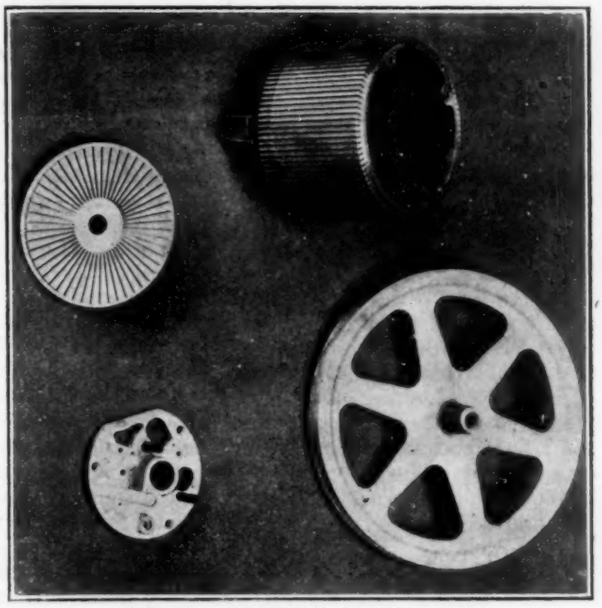

FIG. 1. DIFFICULT DIE CASTINGS

some excellent work on the study of the constitution of zinc-base alloys. The subject has also interested metallurgists abroad due to the failure of some zinc-base die-castings; see Spritzgusslegierungen, by A. Kaufman—Zeitschrift fur Metalkunde, Vol. 14, No. 1.

The deterioration of zinc-base alloys is first indicated by a tendency of the casting to lose its white metallic lustre and assume a dark grey non-metallic color. This color change penetrates through the entire casting at a rate depending upon the atmospheric conditions surrounding the casting in service. Accompanying this change in color is an increase in size of the casting that can first be recognized by micrometer measurements and finally can be recognized by a distortion and swelling readily visible to the naked eye. In some extreme cases the casting will develop large cracks and fall apart.

It has been long recognized by metallurgists that the deterioration of zinc-base alloys can be accelerated by the application of heat and moisture. This has led to the universal adoption of the "steam test" for determining the relative rate of deterioration of zinc alloys. This test consists simply of subjecting the previously measured casting to an atmosphere of steam at normal pressure and measuring the casting at regular intervals. With some alloys an increase in size can be detected after one hour in this test and the disintegration of the casting can be accomplished in twenty-four hours.

It is apparent that in view of the foregoing, many efforts should be made to produce a zinc-base die-casting free from the objectionable properties outlined above. Many zinc-base die-castings have been produced having the strength and ductility of malleable iron, but invariably they have been subject to deterioration under normal atmospheric conditions. No zinc-base die-casting has thus far been produced that can be said to be free from the physical defects outlined above.

Under the trade name of "Ni-Chro-Zink" the Doehler Die-Casting Company now announces the production of a non-corrosive, permanent zinc-base die-casting. Careful laboratory tests indicate that they do not warp, swell or deteriorate. They have been subjected to steam for months without any change in size or other visible deterioration (under the microscope or naked eye) other than a slight surface oxidation. Ni-Chro-Zink valves have been used on a steam line in the laboratories of the Doehler Die-Casting Company with low pressure steam passing through them for a period of three months without any visible deterioration. The outer surfaces of these castings retain their original silver white color and show no signs of oxidation.

Figure No. 2 represents two zinc base die-cast valves. These two valves were set up parallel on a low pressure steam line, and steam permitted to escape through the valve opening. The valve pictured in the upper part of the illustration, was made from one of the standard zinc base alloys, commonly used. The lower valve from Ni-Chro-Zink.

The Ni-Chro-Zink valve showed absolutely no deterioration after three months continual use, the outer surtace having the original white lustrous appearance.

The zinc base alloy shown in the upper part of the illustration, distintegrated as indicated after less than one week of steam test.

Figure No. 3 shows two pulleys, approximately 10" in diameter, the width of the center bosses being approximately 3". These two pulleys were mounted on a shaft with a very close sliding fit between the bosses. Both pulleys revolved freely when mounted on the shaft, yet there is absolutely no side play between them. The entire mounting shown in this illustration was placed underneath an open steam jet.

After three months under this condition, these pulleys revolve freely and independently of each other, indicating that there has been absolutely no swelling of the castings. Measurements taken between the two pulleys, show that there has been absolutely no warpage.

A steel frame supporting the two pulleys, although brightly polished when first put into test, was badly corroded after three months test, yet the Ni-Chro-Zink pulleys

FIG. 2. COMPARISON OF VALVES

showed no corrosion and have retained their original bright metallic lustre.

Die-cast Ni-Chro-Zink water faucets have been in use for a period of three months without any visible deterioration other than a slight surface oxidation.

Die-cast Ni-Chro-Zink test bars ⅛" in thickness have been subjected to steam atmosphere and pulled at regular intervals. No reduction in tensile strength or elongation was visible after 500 hours in this test. The significance of this test is readily apparent to metallurgists having previous experience in testing zinc-base die-castings.

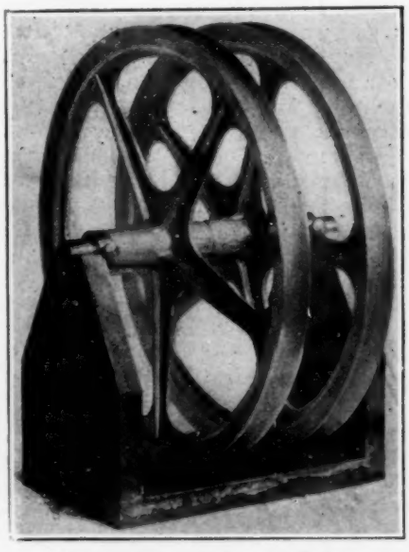

FIG. 3. NI-CHRO-ZINK PULLEYS

Castings of this material will show a tensile strength of approximately 18,000 pounds per square inch and an elongation of four per cent. It can be polished to a high lustre and when so polished resembles aluminum in color and retains its lustre to the same degree that aluminum does. The same degree of accuracy maintained on other zinc-base die-castings can be held on Ni-Chro-Zink castings. Fine threads, small holes, and slots can be cast without any difficulty.

The composition of Ni-Chro-Zink has been made the subject matter of a patent application now pending, and consequently cannot be discussed in greater detail here.

# Operating Foundries Profitably

## Reply to Mr. Harper's Criticism on Standard Foundry Costs*

By W. L. CHURCHILL, Industrial Engineer

Apparently my attempt to guard foundrymen generally from adopting a plan for costing and profiting their products that may not fit the needs of all of them has been construed as an attack upon Mr. Harper's very able presentation of his method. Nothing is further from my intent as I appreciate that anyone who uses Mr. Harper's method (provided he can get business enough to keep his foundry operating) cannot help but make very satisfactory profits. Comparatively few foundries, however, are so located and have established a reputation and prestige that enables them to get business, regardless of the price they quote, at least in sufficient quantity to keep them profitably employed. I have no desire to make this subject controversial in regard to details because I am not personally interested in costing from the standpoint of pure accounting but strictly from the standpoint of economics. Naturally, in the short criticism presented, no attempt was made to discuss all of the accounts that enter into foundry operation, as my only desire was to point out wherein many foundrymen who might apply the method presented would quickly find themselves out of business as they would be unable to induce customers to place orders with them for the heavier castings.

Tiffany & Company are supposed to be a very profitable concern. Their publicity method is one of extreme dignity, not even displaying their name on the door or building where the public passing by can see it. Such advertising as they do is of a few words in small space, and yet I doubt if anyone can fairly criticize Tiffany & Company for not adopting methods of advertising more conspicuously.

The method fits Tiffany & Company, and yet if they should advise the retail jewelry dealers in the country to do as they do and charge the prices that they charge, it would result disastrously for many of the less well established jewelry dealers; especially those who are located that that class of trade that would buy without challenging prices is much more limited than in the vicinity of New York.

To make this point clearer, I will cite the case of one jobbing foundry which specializes on bearings for railway equipment and has been accustomed to quoting prices at a few cents per pound above the market price of copper. Some of these contracts have been as low as four cents a pound over the market price of copper. These prices were quoted for other products as well as railway bearings. In this they, no doubt, erred, for although their equipment enabled them to turn out sixty molds or more per day per molder, on their specialties, such production was impossible for their miscellaneous job work.

And yet this concern in normal times has been highly profitable. Its method of costing and pricing was a profitable one for it to use but unsafe for people situated differently.

There are principles in costing that can be used universally by all foundrymen but neither the method under discussion here if used in its entirely nor the one just above quoted is suited to them all.

I regret that Mr. Harper suspected an implication that there was any attempt directly or indirectly to have all foundrymen adopt the scale of prices submitted. What was meant was that those who might adopt such a method would find it impossible to compete with others who would not adopt it, particularly, on their heavy castings, and consequently, they would have to see this work go to other foundries than their own. Neither is there any thought of preventing foundrymen from charging for all of their service, including that pertaining to the carrying of the investment in the customer's product for the time that such investment is necessary. What I have tried to point out is that in charging ten per cent. profit on the purchase of metal that the foundryman is competing with the banker and the bank has him beaten before he starts.

Any reputable customer who has large quantities of castings to be made, can borrow money from his bank to buy the metal at about one and one-half per cent. for the three months as necessary for the turn-over, instead of paying the foundrymen ten per cent. for this same accommodation.

I am not trying to dictate what the foundryman should obtain for his castings, for that, after all, is a question of supply and demand and not within the control of any person. But, as pointed out before, the buyer that understood his business could make a great deal more money, if in the market for quantities of heavy castings, by simply furnishing the metal to the foundryman himself, than the foundryman would make in the conversion of this material into castings, if the foundry only charges ten per cent. of its cost for this conversion.

## The Principles of Proper Foundry Management, Knowledge of Costs and Profiting†

How to operate foundries profitably is a subject of interest even to those who are making reasonably good returns for their efforts, ability, and risks.

The proportion of foundries that do really make worthwhile profits and consistently, year after year, is altogether too small.

Estimates obtained from two different authoritative sources indicate that the average return to foundry owners the country over is but 4% on the total investment in foundry businesses.

Even granting that a large proportion of foundries are operated by owners who pay themselves living or better salaries out of their operations, the fact remains that foundries as a whole, are not operated as profitably as the service they can and do render industry, justifies.

### CAUSES OF UNPROFITABLE OPERATION

There are, of course, many causes for the lack of satisfactory profits and not all of them controllable by foundry operators. Of the causes that are within control undoubtedly the most prominent is the lack of knowledge of costs. A close second, perhaps, and often but not always allied with the former is an improper basis of profiting.

I mention this factor of "improper profiting" separately from the factor of "cost knowledge" because I have found numerous instances where sufficiently complete and reliable cost knowledge was available to insure successful operation yet by failing to use this knowledge for "proper profiting" its value was nullified..

*Previous contributions to this discussion were published in our issues of October, November and December, 1922.

†This article is abstracted from an address delivered at a meeting of the Metropolitan Brass Founders, New York, November 8, 1922.

Why are foundries so backward in their development of a proper basis for determining the costs of their products and of properly pricing them?

My personal conviction is that this is due to two causes. First, the average or majority of foundrymen are so thoroughly and completely engrossed in the technical processes and operating details of their complex and intricate occupation that they are forced to neglect matters pertaining to the proper determination of costs and selling prices, and arrive at these by haphazard estimating. Second, many foundrymen who recognize their own inability to give time and thought to these problems, delegate them to their bookkeepers or accountants who are forced to rely upon such records of operations as they can secure from workers and compile costs and establish selling prices without the proper technical knowledge of foundry processes to make the most intelligent results.

### PREDETERMINATION OF COSTS

To determine costs of foundry products is far more an engineering problem than it is one of bookkeeping or accounting.

The reason for this is that there are many foundry operations and processes whose costs cannot be accurately calculated from reports of employee activities and that can only be determined by a complete knowledge of just what occurs in the various steps and stages of production of castings.

It means that foundries to know their costs must resort to engineering analyses of their cost factors and build up their costs by assembling such information rather than from accumulation of more or less clouded detail reports of workers activities.

In many respects this is a fortunate circumstance as most foundries are obliged to quote prices before they produce castings for their customers. It means that they must predetermine the costs of their products or else make estimates that have sufficient margin of safety to insure against loss. The latter procedure automatically restricts business volume, so why not accept the situation and convert estimating into true advance costing?

Too few foundrymen realize that this is literally possible. Too few of them know that estimates can be made in such thorough and complete manner from cost standards and by formulæ developed from engineering analyses of all cost factors pertaining to their operations, that such estimates become the actual, absolute, and final product costs.

When foundries do begin to realize this fact their reluctance to adopt positive cost knowledge will disappear for it is far cheaper to determine costs by this principle and in advance of production than by typical but wholly unsatisfactory collecting cost methods.

When foundrymen realize that one trained cost engineer who can be quickly developed in their own plant can establish costs in advance of production for as many as 150 employees the demand for such cost engineers will become very insistent.

### THE COST ENGINEER

What is the cost engineer? What does he do? And how does he work?

First, he is the estimator, who by knowing all of the operations that any given product requires for its production makes up once, and once only, a cost schedule for each and every article that is required to be produced.

Second, he does this advance costing by first preparing the cost standards for all equipment, for all operations, and for all conditions of volume output, etc.

Having established these standards his work is subject to audit and proof by your bookkeeping or accounting department who use his schedules of positive cost knowledge in place of the usual heterogeneous masses of time-tickets and other unreliable and voluminous records of workers activities.

It is my opinion that one of the chief reasons for lack of cost knowledge among foundrymen is the expense, irritation and lack of usefulness of the typical cost collection methods so much in vogue. When it can be stated by such an authority as Edward N. Hurley that not over 20% of cost systems in use are safe and reliable business guides it at once explains one reason why not over 50% of manufacturers attempt the task of finding out what their goods cost.

The typical collection methods of costing are not suited to foundry purposes regardless of their merit in other lines. They fall far short of meeting foundry requirements and although admittedly better than no costs are expensive to operate and unless operated by exceptionally intelligent and resourceful people are apt to be very misleading in their cost conclusions.

To illustrate this, I will cite the case of a gray-iron foundry in the Middle West that a few years ago was producing a line of shelf and stove hardware; the principal lines produced in the foundry were the Mrs. Potts Sad Irons and a line of cast iron stove-pipe dampers.

There was in effect a typical cost collecting plan well handled and thoroughly maintained. The dampers were especially good sellers as they quoted lower prices than competitors and got the cream of the trade, shipping even in car-load lots to the larger buyers.

The sad-irons, however, proved progressively less and less profitable and were apparently being crowded out by Eastern competitors until an engineering analysis was made and the disproportion of melt to product between the two lines was cared for in the costs. When this was done it was found that the excessive cost of melting per unit of damper product and the comparative low melting cost per unit of sad iron product reversed the marketability of these two lines and incidentally the color of the profit and loss entries from red to black.

In another instance an investigation disclosed that a brass foundry department of a manufacturing plant had been the cause of three successive annual deficits because of this factor of heavy remelt that the very complete collecting cost plan had failed to detect. Removing the brass foundry and buying the castings from a foundry that could utilize the excessive remelt in other products put the business back in the profitable class.

Many other instances could be recited to show that the typical methods of collecting cost data for foundry costs have inherent weaknesses that reduce their value as guides in conducting foundry operations.

### ADVANCE COSTING IN SMALL FOUNDRIES

"Advance" costing, however, by properly trained cost engineers insures consideration of all cost factors, even such as cannot be readily accounted for by workers' reports.

Fortunately, this principle of costing is applicable to the smallest as well as the largest foundries. The small jobbing foundry of but few men, the owner operator becomes his own cost engineer, while in the larger plants some one devotes part time to the cost engineer duties while with the greater establishments there may be several, or one cost engineer and assistants.

This means that no foundry is too small or too poor to afford to operate on a basis of knowing their costs once they adopt the principle of determining such costs on a basis that makes cost estimates the actual cost of product.

To most who hear this assertion that estimates can be the true costs, the question arises as to how you can

insure castings or any other goods being produced at exactly the cost estimated for their production.

The cost engineer differs from the cost accountant in that he establishes costs on two different bases. First, the engineer contends that the cost of products are those factors of cost that must unavoidably be incurred to produce castings or any other article. There are costs that you can and should pass along to your customers in the selling price. There are other costs, however, that you cannot pass along to your customer specifically, as he, or his products, are in no way responsible for them. To illustrate,—when a molder spoils a set of molds and is obliged to make a duplicate set, you cannot expect a customer to pay for molding his castings twice over. You will have to bear this loss by charging against your profits.

When you send a boy out to buy fifty two-cent stamps to mail fifty letters with and he loses the dollar or loses the stamps so that you are obliged to buy fifty more, the typical method of cost accounting would show you that fifty letters had cost you four cents each to mail, when they should have cost you only two cents each. The engineer, however, looks at this from a different view point and says that the letters cost you two cents each to mail. The boy, however, cost you one dollar more than he should and you have lost one dollar.

Once this principle is accepted as a correct one, it then becomes merely a matter of insuring that every cost factor is included in all of your advance cost estimates with allowances for average slippage, spoilage, etc. so that all customers bear a pro rata share of such loses and inefficiencies.

### EFFECT ON FOUNDRY OPERATION

Another one of the great advantages of this type of costing in foundries is that it enables comparison of departmental and plant efficiencies so that departments that are in need of betterment in their management are definitely indicated on their weekly pay-rolls.

The effect on departmental foremen, superintendents and others in charge is to put them on their tip-toes to make sure that the production of their departments justifies the payroll and other expenses chargeable to them.

The effect of measuring these departmental efficiencies almost invariably bring about cost reductions and increased output per employee of very substantial nature.

In many instances entire plants increase the per man hour output more than 30% in the course of a few months of measuring output against cost standards established by the cost engineer. Another advantage of using the principles of engineering standards is that many of the elusive cost factors in foundry practice become definitely fixed in regard to their effects upon costs and selling prices. For example; it is a well known fact that even the most competent of molders can produce more molds per day of a given pattern after they have acquired practice upon the pattern. The cost engineer has been able to plot curves showing the rate of acceleration that the average worker should attain in molding different classes of patterns. Such knowledge is used for several purposes; among them being to establish equitable piece-rates that enable the high grade molder who is ordinarily assigned to the odds and ends calling for single or few molds to make wages that are in accordance with his skill and his output. It also enables costs and selling prices to be based upon quantity production so that the customer buying but one or few pieces will pay a proper advance over the customer ordering in large quantities. It means that the same amount of profit can be made per day's effort whether single loose patterns are in use for miscellaneous orders or whether molders are employed continuously on one pattern.

Collecting records of molders activities would never disclose these rates of acceleration in a way to make them useful.

Enough has been indicated to show the possibility and practicability of knowing costs in advance of production, and knowing them at a fraction of the usual expense for collecting historical records of cost.

### HOW TO APPLY PROFITS TO COSTS

The next important factor for insuring foundry profits is to know how to apply profits to costs in establishing the proper selling prices with which to charge customers for castings or other goods.

Profits should be based on what the foundryman sells. Few of us realize that when we make castings, that what we are really marketing is our ability to convert metal into the shapes that our customers desire. The great majority of foundries class this ability as a commodity on an equal basis with the metal they have shaped to meet the customers need.

The fact is that it is an almost universal practice to establish some one rate per pound or some one ratio to total cost in arriving at the proper selling prices.

This practice puts excessive profits on goods or castings whose proportion of metal values are high and penalizes those goods where the effort of converting a small amount of metal into intricate and different shapes is greater in proportion to the value of the metal used.

Many businesses have had very mysterious and disturbing changes in their total earnings due to this practice which automatically encourages the sale of goods where relative proportion of metal is low and discourages the sale of those whose metal values are high.

When foundrymen cease to figure profits on a basis of metal value in their goods, but figure it on the value of the effort required to convert this metal into products they will find it matters not whether they are handling heavy tonnage per employee or light tonnage per employee, the ultimate returns to the business can always be kept at a satisfactory figure provided, of course, that the plant keeps its normal force consistently employed.

This phase of handling foundry business has not been given the attention that it deserves and in consequence much business that could and should be handled by foundries drifts to sheet metal or other substitutes.

As a glaring example, of the inequality of pricing by a flat percentage of profit to total cost, I will quote two extremes taken from a brass foundry price list of recent publication.

On this price list brass castings have a classified scale of prices based upon the number of pounds of castings per mold. Castings weighing one pound per mold have a selling price of $2.28 and show a total profit per molder day output of $3.66. Castings weighing fifty pounds per mold have a selling price of 32½ cents per pound but show a profit per molder day of $26.13.

Obviously if one foundry should specialize on the one pound castings it would make at the end of the year less than 15% as much as another foundry employing the same number of people engaged exclusively upon fifty pound castings. As a matter of fact, the skill required for the lighter castings is usually much greater than that used for the heavier ones, yet this basis of calculation of profits returns very much less for the skilled effort than for the ordinary.

Reverting again to the two principal causes for the low average return for foundry operation "Lack of Knowledge of Costs," and "Improper Profits," it will be readily appreciated how utterly needless is the existence of either of these causes provided that the former is eliminated. "Know your costs." This is not as difficult as most foundrymen have been led to believe. If foundrymen realized how easily this cost knowledge can be established none would be content to run a foundry another day before putting himself in position to know the cost of his products and what profit to put on them.

# Dial Copper and 12% Watch Nickel

## An Article Describing the Manufacture of These Products From the Raw Material to the Finished Product—Part 2*

By WILLIAM B. PRICE, Chief Chemist and Metallurgist, Scovill Manufacturing Company, Waterbury, Conn.

Plate 7 shows the microstructure of the hot rolled copper. Fig. 1. original mag. 25X shows the upper section of the hot rolled bar. Note the dark layer of cuprous oxide. This is shown more clearly in Fig. 2 (original magnification 75X). The fine crystals of pure copper can be seen bounded by straight lines. The oxide particles are shown as black dots. As mentioned before, this layer of cuprous oxide is thoroughly removed before the bar is rolled into dial copper.

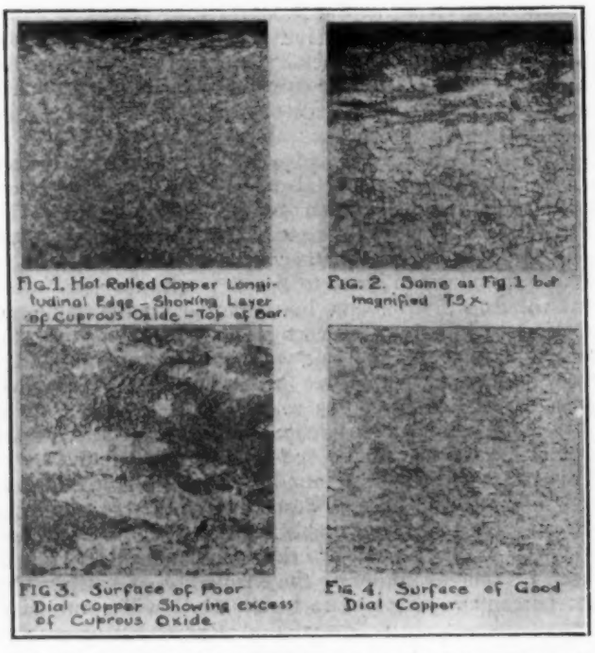
Fig. 1. Hot Rolled Copper Longitudinal Edge - Showing Layer of Cuprous Oxide - Top of Bar.
Fig. 2. Same as Fig. 1 but magnified 75 x.
Fig 3. Surface of Poor Dial Copper Showing excess of Cuprous Oxide.
Fig. 4. Surface of Good Dial Copper.

PLATE 7. MICROSTRUCTURE OF HOT ROLLED COPPER

The structure of a sheet of copper in which the excess of oxides are not removed is shown in Fig. 3. The black dots are cuprous oxide.

Good quality dial copper is shown in Fig. 4. Note the even distribution of whatever oxide there is present; also the uniform crystals of pure copper.

### DISEASES OF COPPER

Copper is not so sensitive to variations in conditions and operations of manufacture as are tin, zinc, and other metals. It may be either quenched in water or slowly cooled in air from a bright red heat (900° C.) without injury. Copper can, however, be overheated and burned.

If heated to and worked at temperatures near the eutectic melting temperature (1063° C.) the copper may be burnt, pits formed, and grain boundaries become oxidized.

When copper is heated to 800° C. and above in an atmosphere of reducing gases Co, H, etc., the gases permeate into the copper and reduce the $Cu_2O$; water is formed acording to the following equation—$Cu_2O+H_2=H_2O+2Cu$, as steam under pressure, and produces fine cracks throughout the copper. Such copper is described as "gassed," and is weak and brittle. Plate 8 shows the structure of "gassed" copper. Fig. 1 illustrates a piece of copper fractured by the action of reducing gases. Figs. 2 and 3 show intercrystalline cracks resulting from the reduction of the suboxide and are typical of "gassed" copper. Figs. 4 and 5 show a cross-section of a rectangular bar of copper where the grains are separated in the deoxidized part and the deoxidized part is partly separated from the mass of the material, probably due to the fact that it occupies a larger volume than it originally did. Fig. 6 shows the results of rolling copper where the grains have been separated by "gassing" or deoxidation.

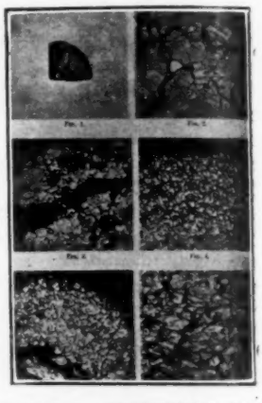

PLATE 8. STRUCTURE OF GASSED COPPER

### COLD ROLLING

The clean overhauled ½-inch bars are now ready to be cold rolled.

They are reduced in gauge by being passed through revolving chilled cast iron rolls. This operation is shown in Plate 9.

Since mechanical working of copper hardens the metal, it is necessary to anneal at various stages in the rolling process. After being annealed the copper is pickled in a dilute solution of sulphuric acid containing sodium bichromate. After washing in water, the sheet is again put through the same process until the desired thickness is obtained.

### INSPECTION AND SLITTING

The copper is now carefully inspected to detect any flaws. This is done by winding and unwinding on wooden rollers, both sides being carefuly scrutinized by the inspectors.

This is illustrated by Plate 10.

The inspected copper is then slit to size on the slitting machines. Such a machine is seen in Plate 11.

The finished metal is then coiled and packed in cases, and shipped to the customer.

## 12% WATCH NICKEL

### COMPOSITION

The composition of our 12 per cent Watch Nickel is 64 per cent copper, 12 per cent Nickel, 1 per cent Lead and 23 per cent Zinc.

### CASTING

The first and most important step in the production of Watch Nickel is the melting and casting of the metal. Extreme care must be taken to see that the molds are clean and heated to the proper temperature. The proper strainer must be used and the melting and pouring temperature carefully controlled in order to insure sound metal, as any failure at this stage of the process cannot be eliminated or rectified by later manipulation.

### CHARGING

The charge—consists of the proper percentage of new metals and scrap, and is placed in a large crucible made of

*An address delivered before the Foremen's Association, Waltham Watch Company. Part 1 was published in our issue of January, 1923.

clay and graphite, and having a capacity of about 830 pounds. The crucible is placed on a pedestal inside an oil fired furnace. The whole furnace is tilted at the proper angle so that the metal may be poured directly into the molds which are set on the floor below. First the nickel is placed in the bottom of the crucible and then the scrap is added. The pigs of copper are placed between the walls of the furnace and the sides of the crucible, until they start to soften, when they are placed in the crucible. As the charge begins to melt a quantity of common salt is added to reduce the oxides and flux off the dirt. A shovelful of charcoal is also added to protect the surface of the metal from oxidation and the action of the furnace gases.

ADDING THE ZINC

As soon as the charge is all melted and the proper temperature reached the zinc is added. The zinc is held in iron tongs and pushed down into the molten charge until melted.

The introduction of the zinc cools the melt and the metal is heated until it has reached the right pouring temperature.

**This article will be continued in an early issue.—Ed.**

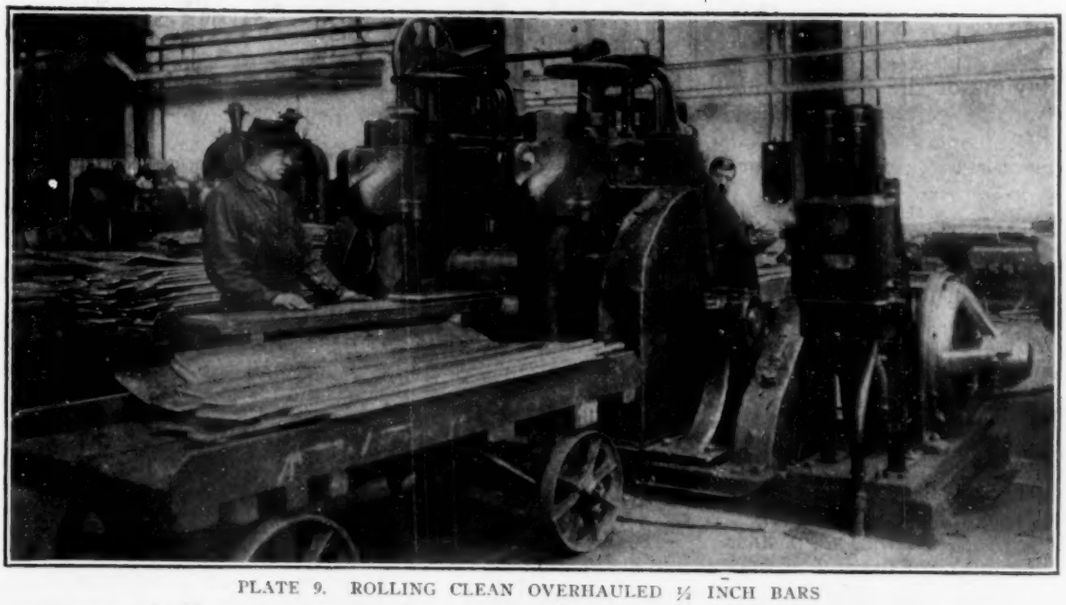

PLATE 9. ROLLING CLEAN OVERHAULED ¼ INCH BARS

PLATE 10. INSPECTING THE SHEET AFTER REDUCING TO GAUGE

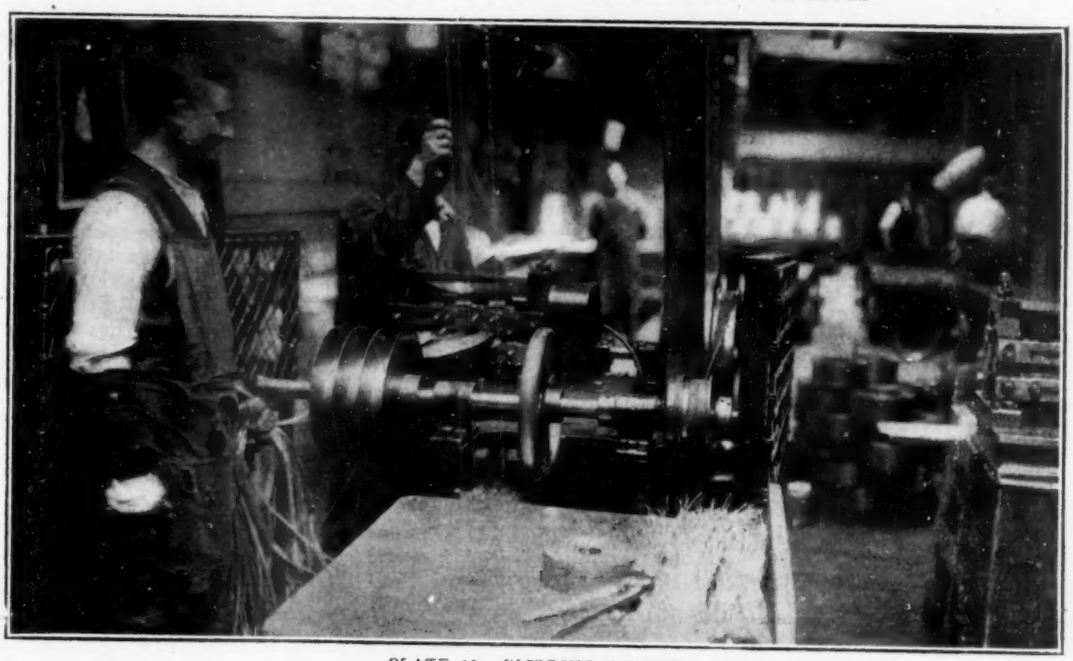

PLATE 11. SLITTING TO SIZE

# The Year's Progress in Metals

## Review of the Progress Made in 1922 in Metals, Their Alloys, and Their Application to the Industrial Arts—Conclusion*

Compiled for The Metal Industry by R. E. SEARCH, Exchange Research Editor

### METALLIC STATE AND STRUCTURE

Rate of Combination of Copper and Phosphorus at various Temperatures. C. A. Edwards & A. Murphy. Jour. Inst. Met. also Met. Ind. *20*, p. 139.

Dip-Brazing with 80:20 brass and Heat-Treatment of brazed joints. E. V. Schaal, Chem. & Met. Eng. *26*, pp. 1121-25, also C. A. *16*, p. 2837.

Temper Colors of Metals. G. Tammann, Stahl und Eisen, *42*, pp. 615-19.

Eutectic Structure of Metals,—attempt to correlate the microstructure of the component metals. F. L. Brady. Met. Ind. *20*, p. 384.

Grain Size and Diffusion. J. H. Andrews & Robert Higgins, Met. Ind. *20*, p. 383.

Grain Growth and Recrystallization in Metals. I. Definition. II. Experimental Data and General Laws. III. Underlying Causes. Zay Jeffries & R. S. Archer. Chem. & Met. Eng. *26*, pp. 342-45; 402-10; 449 57.

Effects of Impurities on Recrystallization and Grain Growth. Research Staff, General Electric Co., (London). Jour. Inst. Met. (1922) also Engineering, *113*, pp. 342-46.

Season Cracking and its Prevention,—Condenser Tubes. H. Moore & S. Beckinsale, Jour. Inst. Met. also Engineering, *113*, pp. 337-40.

Thermal Treatment of Metals, its phenomena, with phase-diagrams of the alloys: Cu-Al; Cu-Zn; Al-Fe; Ni-Zn; Pb-Sm; Pb-Bi; and Al-Cu-Si; with many photomicrographs. The author's conclusions are that the results obtained by quenching and annealing of these alloys, show that all participate in the phenomena in the same way. The constituents obtained by quenching at room temperature are partially or completely dissolved. The precipitation of these constituents by annealing involves an increase of the hardness and of the resistance to attack of reagents; also that these results are due largely to the fineness of the state of division of the material. Leon Guillet Rev. de. Met, *19*, pp. 162-77.

Thermal Treatment of Mg-Cd alloys. The conclusions reached are: that neither quenching nor annealing have any influence upon the structure or the properties of these alloys. They do not act like the alloys of Au-Cu; the quenching does not appear to keep their condition stable at a high temperature, even partially. The *beta* and *beta prime* solutions are malleable at a high temperature even when they are produced by a transformation of the *alpha* and *alpha-prime* solutions. They are malleable at ordinary temperatures. All the industrial application centers about the zone of pure *beta-prime* in proximity to the magnesium. Leon Guillet, Rev. de. Met, *19*, pp. 359-65.

Thermal Expansion of Cr and Ni-Cr Alloys over an extended range of temperatures. P. Chevenard. Compt. rend. *174*, pp. 109-12, also C. A. *16*, p. 1922.

Defects of Non-Ferrous Metals; caused by gas absorption and oxidation. B. Woyski & Jno. W. Broeck, Met. Ind. *20*, pp. 267, 307.

Mechanics of Metallic Oxidation at High Temperatures. N. B. Pilling & R. E. Bedworth, Met. Ind. *20*, p. 213.

Prevention of Segregation in castings of high lead Bronzes. R. E. Dee & F. B. Thrace, Met. Ind. *20*, p. 214.

Colloidal State in Metals. I. Molten Metal. II. Crystallization. III. White Metal and Brass. J. Alexander, Chem. & Met. Eng. *26*, pp. 54-58, 119-23, 170-72 also in Z. f. Metallkunde, *14*, p. 135.

Solubility of Gases in Aluminum. Determination of the gases absorbed by molten aluminum, over which the following gases were passed: N. O. Air, CO $CO_2$, $H_2S$, H and illuminating gas. J. Czochralski, Z. f. Metallkunde, *14*, pp. 278-95.

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Blue Constituent in High-strength Manganese-Bronze. E. H. Dix, Met. Ind. *20*, p. 216.

Recent progress of Microscopic and Macrographic Metallography. Leon Guillet, Rev. de Met. *19*, pp. 614-25.

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Lead, Separated as Chloride from Metal Drosses & Lead Residues. Archibald Craig, Met. Ind. *20*, p. 338.

Calite, a new heat resisting alloy, whose heat resistivity is 32.5 times that of nickel. G. R. Brophy, Trans. Amer. Soc. Steel Treating, *2*, pp. 384-6, also C. A. p. 1383.

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### PROPERTIES OF METALS—PHYSICAL AND MECHANICAL

Investigation of the Properties of German Silver. W. Voigt, Z. f. anorg. Chem. *120*, heft 4, pp. 309-19.

Hardeners. New method of hardness testing; of bronzes containing P., Pb. and also the ordinary bronzes; also with some friction tests on the author's new machine. L. Jannin, Rev. de Met. *19*, pp. 109-16; 117-19.

Variation of the Mechanical Properties of Co, Cu, Brass, Al, Duralumin, Al-Zn; Al-Zn-Pb alloys at low temperatures. Leon Guillet & Jean Cournot, Rev. de Met. *19*, pp. 215-21.

Mechanical Properties of the Alloys of Al. & Mg. B. Ohtani, J. Chem. Ind. (Japan), *25*, pp. 36-52, also C. A. *16*, p. 3298.

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Influence of Bismuth in Red Metal composed of 86% Cu, 9%Sn & 5%Zn on its hardness, resistance to torsion, to impact, with detailed metallographic examination. J. Czochralski, Z. f. Metallkunde, *14*, pp. 70-72.

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Density Measurements of Metals and Alloys at High Temperatures, especially in their fluid state. The buoyancy method used for the determinations. Systems Cu-Sn and Cu-Al investigated. One of the most valuable investigations ever conducted. K. Bornemann & F. Sauerwald, Z. f. Metallkunde, *14*, pp. 145-49.

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Physical Properties of Cu-Si alloys, of the sand-blasted metal. E. H. Dix, Met. Ind. *20*, p. 265.

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Effects of Impurities in Electrolytic Zinc. G. D. Scholl, Met. Ind. *20*, p. 268.

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New application of the pyrometer. Pierre Chevenard, Rev. de Met. *19*, pp. 546-61.

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Nickel, Monel Metal, Stellite, Stainless Steel and Aluminum,—thermal expansion of. W. H. Souder & P. Hidnert, Bureau of Standards Science Paper No. *426*, Z. f. Metallkunde, *14*, p. 343.

# The Cleaning of Aluminium Utensils

## Adding Sodium Silicate to Hot Soda Solution*

By RICHARD SELIGMAN, Ph.nat.D., Member of Council, and PERCY WILLIAMS, B.Sc., Member (London)

For nearly half a century the difficulty of cleansing aluminium has hindered its entry into household and factory. This difficulty has been due to the fact that the metal is freely dissolved by hot soda solution, the most common detergent. Thus, for instance, a solution containing 5 per cent of $Na_2CO_3$, $10H_2O$ dissolves 53000 mg. of aluminium per 100 cm. of surface per twenty-four hours at 75° C., whilst at boiling point a 1 per cent solution dissolves 80,000 mg. In the cold under certain conditions which commonly arise discoloration of the metal and "pitting" readily take place.

Although, in the hands of the expert, soda solutions may be used with impunity, the figures cited above are sufficient to justify the slogan of the aluminium hollow-ware manufacturers, which many have even inscribed indelibly upon their wares, "Use no soda."

Such precautions become entirely unnecessary if the simple device be adopted of adding very small quantities of sodium silicate to the soda.

Some years ago the surprising observation was made that aluminium was immune to attack by water-glass solutions, which at once suggested that the well-known detergent properties of such solutions might be enlisted for cleaning the metal. This was done with complete success. Water-glass is, however, an inconvenient material to put into the hands of the general public, and the problem could not therefore be regarded as completely solved.

It is necessary to consider here what is the cause of this unexpected phenomenon. It seems probable that the aluminium is at first superficially dissolved by the alkali in the water-glass, but becomes coated immediately by an insoluble protective covering of colloidal aluminium silicate. Although the correctness of this view cannot be considered as rigidly proved, there is but little doubt that it truly represents what occurs.

If, for instance, aluminium be placed in a cold solution containing 0.1 per cent of caustic soda, attack, accompanied by visible evolution of hydrogen, commences in a few seconds. If, however, the aluminium be first immersed in a boiling 1 per cent solution of sodium silicate and then, after washing, plunged into the same caustic soda solution, the attack is retarded, the degree of retardation depending upon the length of the immersion in the silicate solution, and reaching its maximum (about an hour to an hour and a quarter) after a preliminary immersion of thirty minutes.

If the aluminium be allowed to dry between the two immersions the retardation is reduced to at most thirty seconds, whilst wiping the surface with a soft rag apparently removes the protective coating entirely. The strength and temperature of the silicate solution affect the retardation, and a boiling 1 per cent solution is most effective.

If the explanation of the phenomenon given above were correct it seemed probable that the presence of even small quantities of sodium silicate in soda solutions would produce the same effect as a solution of water-glass, and this was found to be the case. For example, a solution containing 5 per cent $Na_2CO_3$, $10H_2O$, and 0.05 per cent $Na_2O$, 2.2 $SiO_2$, is without any visible action on aluminium at 75° C., and the attack by a 5 per cent soda solution is immediately arrested by the addition of an amount of sodium silicate equal to 1/100 of the soda in the solution.

By this observation the problem may be considered solved, because detergents consisting of a mixture of soda and sodium silicate are articles of commerce and readily procurable in most parts of the world. Among those which have been used with complete success are compounds sold, for domestic purposes, under the following trade names: "Carbosil," "Pearl Dust," and "Aquamol." Their sodium silicate content is about 10-12 per cent. Boiling solutions made up with London tap water and containing 0.5 per cent and over of these materials remove grease readily without affecting the aluminium in any way, but weaker solutions show a slight solvent action, with the production of a brown film which always appears to accompany very slow dissolution of aluminium by alkaline media. From this it may be concluded that the only safeguard to be observed in cleansing aluminium utensils with soda solutions containing sodium silicate is that enough of the latter must be used to leave some of the silicate over after the lime salts, etc., present in the water have been saturated, and that after the cleansing operations the detergent be completely washed away.

It is hoped that the observations here recorded may relieve the difficulties of many who have had to clean aluminium, and may induce many more to use the metal who, but for these difficulties, would have availed themselves of the manifold advantages which aluminium offers.

*A note read at the Swansea Meeting of the British Institute of Metals, September 20-22, 1922. Published, outside of the Institute, for the first time, in The Metal Industry.

# White Metals

## A Review of the Principal Classes of White Metals, Their Composition and Physical Properties, Chiefly in Relation to Their Uses and Manufacture.—Part 2*

By A. H. MUNDEY, C. C. BISSETT and J. CARTLAND

### 8. TIN, 78 PER CENT; ANTIMONY, 11 PER CENT; COPPER, 11 PER CENT; LEAD, Nil.

| Tensile Test | | Brinell Hardness Number | Compression Test. Tons per Sq. In. | |
|---|---|---|---|---|
| Tons per Sq. In. | Elongation per Cent. on 2 In. | 10-mm. Ball, 500 kg. | Yield Point, 0.001 In. | Compressed to Half Length |
| 6.36 | None | 37.0 | 4.550 | 17.856 |

The white metal which is commonly called plastic metal is usually of the above approximate composition. In some cases a little lead is added. It is used very extensively by millwrights and marine engineers for repair jobs; it is hard and durable, and it is self-tinning. The constitution of this alloy lends itself to its employment in the special manner which has suggested its name. The period of solidification from the moment of the falling-out of the copper-tin constituent to the final freezing of the eutectic is an extended one, and during this period the metal is in a plastic condition; consisting at this time, as it does, of a mixture of crystals and liquid, it will "bind" in much the same way as thawing snow and for a similar reason. It is therefore capable of being spread and fashioned into the form required, somewhat similar to the function of making a plumber's "wipe-joint."

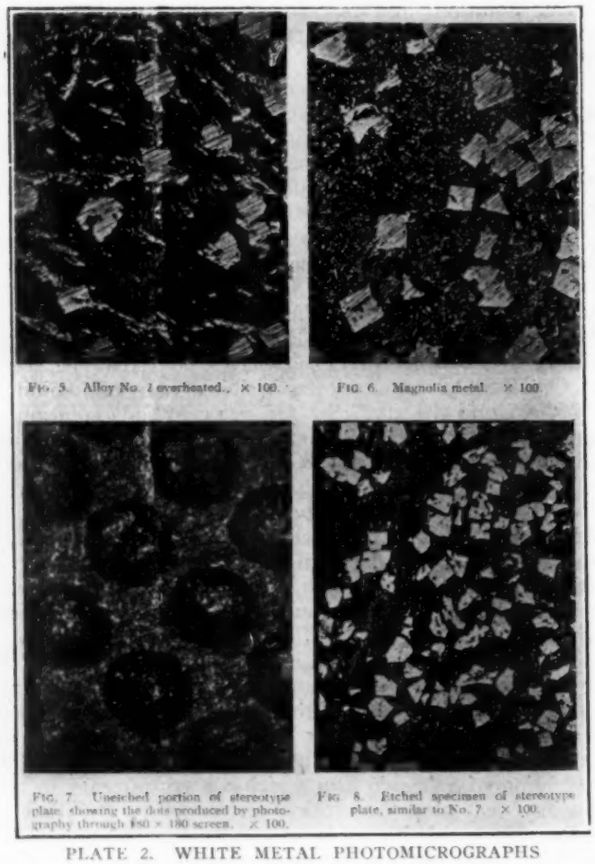

FIG. 5. Alloy No. 1 overheated. × 100.

FIG. 6. Magnolia metal. × 100.

FIG. 7. Unetched portion of stereotype plate, showing the dots produced by photography through 150 × 150 screen. × 100.

FIG. 8. Etched specimen of stereotype plate, similar to No. 7. × 100.

PLATE 2. WHITE METAL PHOTOMICROGRAPHS

Repairs of an extensive character have been effected at sea and on the field behind the battle-lines with this metal, and the artificer who is working at a distance from his repair depot or supply base is usually careful to have a small stock of it to hand.

### 9. TIN, 5 PER CENT; ANTIMONY, 15 PER CENT; LEAD, 80 PER CENT

The lead-base bearing metals are fairly represented by that known as magnolia metal. This is usually of the above composition, with sometimes a small portion of bismuth added.

It will be seen from Fig. 6 (Plate 2,) that the same general rule obtains for the success of a lead-base antifriction metal as for the tin-base ones already described, the structure consisting of the hard cuboid tin-antimony crystals in a matrix of the tin-antimony-lead eutectic. Just as in the tin-base alloys these tin-antimony cuboid crystals stand up in slight relief **when in use,** and the slightly lower surface of the matrix assists the lubrication in the way already described. These alloys deserve much more attention than they usually obtain, and in circumstances when the engineer can arrange with his designer to provide rather long bearings, ensuring the distribution of the load over an extended area, excellent results in running and endurance can be obtained.

It will be seen that the action of tin-base and lead-base bearing metals are very similar, the essential difference being that in the former the copper-tin ε constituent prevents the segregation of the tin-antimony crystals, and the matrix of tin hardened with copper is tougher than that of the lead-base alloys. Alloys of this character are specially useful in accommodating and rectifying slight want of alignment in the erection of shafting or in similar conditions. It is worth noting that alloys of this description are being employed very largely at the present moment on continental railways, particularly in Central Europe.

| Tensile Test | | Brinell Hardness Number | Compression Test. Tons per Sq. In. | |
|---|---|---|---|---|
| Tons per Sq. In. | Elongation per Cent. on 2 In. | 10-mm. Ball, 500 kg. | Yield Point, 0.001 In. | Compressed to Half Length |
| 4.69 | 2.8 | 24.9 | 3.59 | 13.356 |

Bearings of this alloy have recently been found to be capable of carrying their load and continuing their duty under increased temperatures to a greater extent than many tin-base bearing metals in similar circumstances. This is in agreement with theoretical consideration, but is by no means the commonly accepted view of engineers.

The employment of the alkaline-earth metals, barium and calcium, as hardeners of lead for the preparation of bearing metals is a matter of great interest, but its importance from a manufacturer's point of view is considerably less at the present moment than during the period of the war, when tin was scarce and correspondingly expensive, and when these alloys promised some relief as substitutes for tin-base alloys.

The difficulties attending re-melting, due to the losses of the hardening constituents by oxidation, are very real, the production of excessive dross being a drawback which all engineers will appreciate, as the conditions under which metal has to be re-melted for relining bearings on service are frequently very different to those which obtain in a laboratory or in a well-ordered foundry.

*A paper presented at a meeting of the British Institute of Metals, September 20-22, 1922, at Swansea, England. Part 1 was published in our issue of January, 1923.

†Journal of the Institute of Metals, No. 1, 1921, vol. xxv. pp. 171-174.

review of a typical case of these alloys by Mr. Rolfe in the communication on Brace's paper† fairly covers the ground so far as their industrial application has proceeded. The authors are naturally watching the development with much interest.

### TESTING OF BEARING METALS

The testing of bearing metals is generally performed by running sets of bearings of the various alloys under service conditions for a certain period, if possible extending to several months, giving them constant attention and subjecting them under observation to conditions as nearly similar to one another as possible, so that the results may be fairly comparable. At the expiration of the period decided upon the bearings are examined, if they have not failed or given actual trouble in the meanwhile. The observed behavior in running, and also their condition at the end of the trial, indicate their value; but the test is not a scientific one, and though thoroughly useful in showing that a certain alloy will make a satisfactory bearing, it is unsafe to condemn one which may have failed, as in trials of this character abnormal conditions may arise which escape notice.

Test-room trials are much more accurate and valuable, but are usually discounted by the works engineer as being too academic or as being under conditions which do not indicate the usual working conditions.

The method employed by the authors gave some interesting comparative trials, but much more experimental work is required before the results can demand the confidence of engineers. The method employed was as follows:

A Thurston machine designed for oil testing had its bearings replaced by others of exactly similar form in the several alloys to be tested. Trial runs, using these bearings under similar conditions as to pressure, speed, and duration, were made, and figures obtained in (*a*) rise in temperature per 1,000 revolutions, (*b*) coefficient of friction as shown by the tendency to seize and indicated by the swing of the pendulum of the machine. The drawback to these trials consisted in the fact that some alloys were suitable for light loads and fast speeds, whilst others were more efficient for heavy loads and slower running. Actual comparisons are therefore not correct. In all cases the bearings are freely lubricated, usually by pad lubrication.

There is always to be noted the degree of finish of the bearing; this is met by the only reasonable method of boring and scraping the bearing to the highest possible degree of refinement in workmanship. The human element, represented by the skill of the mechanics, cannot be eliminated.

It would be difficult to overstate the necessity for constant care and observation, as to the temperature and casting conditions, in the use of the white bearing metals. The effects of these varying conditions were convincingly presented by Fry and Rosenhain* in their observation on a typical bearing metal, and it is very easy for errors in judgment or manipulation to arise under the conditions which frequently obtain in service. The metal in a ladle becomes slightly cooled, solidification of certain constituents commences, and the pouring is hurried, virtually a liquidation process ensues, and the necessary hardening constituents remain behind in the ladle. On the other hand, if the tendency to solidify is noticed and the metal is reheated sufficiently to obtain rapid resolution, serious overheating with consequent damage will result.

The remarks by Fry and Rosenhain on hammer dressing of bearings are confirmed by the experience of the authors. It is known that this is a custom which is well established, the evident intention being to consolidate the material by cold-working. In reality it has a slight softening effect, and in those alloys in which the hard constituents are closely packed the crystals are seriously crushed, and, by the destruction of their natural orientation, their interlocking is diminished and the alloy is weakened, or in some cases even cracked.

*Journal of the Institute of Metals, No. 2, 1919, vol. xxii, pp. 217-223.

### SUMMARY

1. The chief value of white bearing metals is due to the way in which they maintain the oil film. This is effected by the hard constituents standing up in use in slight relief, the softer matrix thus forming numerous evenly distributed channels, which maintain the oil by capillarity.

A single metal, or a metal consisting of a solid solution, will **not** function as a bearing metal.

2. In the tin-base bearing metal the copper-tin crystals solidifying out first entangle the cuboid tin-antimony crystals which subsequently form and prevent their segregation, thus ensuring even distribution.

3. The functions of tin-base and lead-base alloys are similar; the latter could be much more generally used than is the case at present, the chief differences being the action of the copper-tin crystals mentioned in (2) and the fact that the matrix in the tin base is tougher.

4. The greatest care and skill must be exercised in the handling of bearing metals in practice, otherwise either the hardening constituents will be left in the ladle by liquation or the metal will be overheated and the structure spoilt.

**This paper will be continued in an early issue.—Ed.**

## Contraction and Shrinkage of Alloys

On the basis of the available information, the following conclusions may be drawn as to the contraction and shrinkage of alloys as related to foundry practice:

1. The linear contraction of any alloy depends upon the exact chemical composition of that alloy, and relatively small amounts of impurities affect the contraction.

2. The wide variation in contraction among the alloys of a given class—for example, brasses, bronzes, or aluminum alloys—indicates that it is poor practice to employ a rough figure as the contraction of alloys of a given class in general, since by so doing much difficulty arises in producing master patterns and in obtaining castings with a minimum of wasters.

3. Theoretically, the higher the pouring temperature the greater the contraction, as less metal can be held in a mold cavity at a higher temperature than at a lower temperature. Actually, pouring at an intermediate temperature gives greater contraction than pouring at a high temperature or a low temperature on account of the effect of gas evolution in the case of alloys poured at high temperatures. The evolution of gas referred to causes actual expansion, thus interfering with the normal contraction and yielding less contraction.

4. Other things being equal, the smaller the cross section the less the contraction for a given length.

5. Other conditions being the same, the greater the length for a given cross section the less the contraction.

6. The linear contraction of alloys depends upon the kind of mold employed, the contraction being greater in chill molds than in sand molds, other conditions being the same.

7. In sand molds, the contraction in a casting depends upon the contour of the pattern, the mass of the castings, and the size and distribution of the gates and risers—that is, the method of molding.

*Robert J. Anderson, Metallurgist, U. S. Bureau of Mines. The above is an abstract of a report on Contraction and Shrinkage of Nonferrous Alloys as Related to Casting Practice.

# Survey of Nickel Solutions

**To Bring Out in an Orderly Fashion Much of the Data on Nickel Solutions Scattered Throughout Various Sources, That Will Be of Value to the Electro Plater and to Refute Some Statements Are the Purposes of This Article. Part 3***

**Written for The Metal Industry by JOSEPH HAAS, JR., Plating Superintendent**

### IMPORTANCE OF NICKEL PLATING

It has been estimated by the Bureau of Standards of the United States, that three-fourths of the plating done in this country is nickel plating. The popularity of nickel as a decorative coating is due to the properties of nickel itself. Its whiteness, comparable almost with silver, but much cheaper than silver; its hardness comparable with steel; non-oxidizing, even in damp and acid atmospheres, it has an enviable place among deposited metals. The plater is called upon to deposit nickel on all metals, copper, brass, iron, steel, zinc, lead and britannia metals. The importance of properly understanding nickel plating therefore cannot be overestimated.

### NICKEL SALTS USED IN SOLUTIONS

Many solutions have been proposed for depositing nickel, and there exists today a great diversity of opinion as to whether the double salt, nickel-ammonium sulphate, or the single salt, nickel sulphate should be used as the basis of the nickel solution. Many platers are using only the double salt, and are satisfied with their results. Others are using the single sulphate, while still others use a combination of the two. However, the single salt solution has proved its worth, and is far beyond any experimental stages, so that it is in the industry to stay.

Experience in late years has led many platers to discontinue the use of double salts, as a basis for nickel solutions and use in its place the single salt, because of its greater solubility, ease of solution, high metal content and the higher current density obtainable with its accompanying fine grained deposit. At one time the most serious objection to the single salt solution was that an attempt to use single nickel sulphate alone, or with the addition of only sodium chloride, resulted in a failure; either merely a dark coloration, or a green deposit resulting. This was because the nature of nickel sulphate was not understood. Yet, entirely satisfactory deposits can be obtained from nickel sulphate alone, of the proper concentration. All of the difficulties have been explained, and it has been clearly demonstrated that the nickel sulphate solution can and does deposit nickel just as readily and just as satisfactorily as the double salt solution. The only possible objection against the use of nickel sulphate solution is that its resistance is greater than that of nickel-ammonium sulphate, which is true if nothing is added to the nickel sulphate. Those making such a contention lose sight of the fact that nickel sulphate is a simple salt, and that nickel ammonium sulphate is a complex salt, nickel sulphate plus ammonium sulphate. If ammonium sulphate can be added to nickel sulphate in the ratio of 1 to 2 to form nickel ammonium sulphate, a salt of difficult solution, low metal content, but of low resistance, then substances may be added to nickel sulphate that will allow the resulting solution to retain its great solubility, high metal content and have its resistance decreased. With proper additions to the nickel sulphate solution, it immediately becames a better conductor and is far more efficient than the nickel ammonium sulphate solution. Moreover, the deposits from the nickel sulphate solution are closer grained than those obtainable from double salt solutions. The durability of such a deposit is, therefore, much higher. As a result the tendency to use sulphate as the basis of nickel solutions has been on a steady increase. There only remains, as a nickel salt worth considering, nickel chloride. Langbein objects to the use of nickel chloride as a basis for depositing nickel upon iron and steel contending that articles plated in such a bath exhibit a great tendency to rust. He is correct in his contention that nickel chloride should not be used for such a purpose, but his explanation is inadequate. Such a solution is not only unsuitable for iron and steel, but also unsuitable for brass. A nickel chloride solution, 16 ozs. per gallon with additions of ammonium sulphate, boric acid, magnesium sulphate, operated under practical conditions 1.9 volts and 10 amperes per sq. ft., 1.5 volts—7 amperes per sq. ft., 1.3 volts—5 amperes per sq. ft., while it gives a smooth, white deposit, easily buffed, gives a brittle deposit upon steel and brass. A brittle deposit is a coarse grained deposit and relatively porous, which accounts for its peeling and rusting rapidly.

### CONDUCTING SALTS

Nickel baths have a poor conductivity, and to improve this conductivity, so that deposition may be carried on at lower voltage and higher current densities, various substances are added to assist in the discharge of nickel ions at the cathode. These salts are not actually decomposed, under the proper conditions, but act as catalytic agents in aiding the deposition of nickel. This is true only as long as nickel ions are present in the cathode area in sufficient amounts. But if, for the current strength used, there is a deficiency of nickel ions, then other substances will be evolved or deposited at the cathode.

Le Blanc's conception of ionic charges at the electrodes is in harmony with actual practice. "All ions present in an electrolyte, take part in the conduction of the current, but only those ions separate first which give up their electric charges most easily. The other ions must wait their turn in the order of their ease of deposition." From this and from observation of nickel solutions of high metal content, it is evident that so long as we have a sufficient quantity of nickel ions present at the cathode under definite current conditions, those substances added to nickel solutions to aid in conductance will not be decomposed. Those substances added as conducting agents, may function also in some other capacity.

Conducting salts should be added in moderation, with a sufficient amount of metal in the solution. If too much dependence is placed upon conducting salts, the result will be an improvished solution around the cathode, a strong evolution of hydrogen, a low current efficiency with attending bad deposits. Of the substances added to nickel solutions to aid its conductivity, the most notable are sodium chloride, ammonium chloride, and nickel chloride. Langbein's statement as regards the rusting of iron and steel plated in solutions containing chlorides is not borne out by actual practice. He attributes the rapid rusting of iron and steel deposited with nickel from baths containing chlorides, to chlorides being occluded in the deposit, and then by electrolytic action, the deposit corroding. There are other factors like acidity and current density affecting the structure of the deposit that have an important bearing on the rusting of such articles that have not been taken into consideration by such a state-

*Parts 1 and 2 appeared in our issues for September, 1921 and November, 1922.

ment. Tests on iron and steel plated in baths with and without chlorides have shown no difference in rusting if all other factors have been kept constant.

Sodium chloride, of the salts mentioned above, is the best conductor, being slightly better than ammonium chloride. However, ammonium chloride is preferable, due to the solubility of basic nickel salts in its forming ammonium compounds. Ammonium chloride should not be added above 3 ozs. per gallon, because above that amount, double salts of nickel formed will crystallize out. When nickel content is low, and anodes are not corroding properly, nickel chloride should be used up to 3 ozs. per gallon. Chlorides aid anode corrosion and decrease polarization voltage, thus enabling the use of higher current densities at a lower voltage.

If the conducting salts added to nickel solutions act in the capacity of catalytic agents, and are thus neither discharged nor destroyed, then the question may be asked how can they increase the conductivity of a solution, since increase in conductivity axiomatically means that ions be discharged at a greater rate at the electrodes. LeBlanc's already mentioned conception of ionic discharges at the electrodes leads only to the following conclusion of the manner in which conductivity is increased: Since all ions take part in the conduction of the current, but only those ions separate first which give up their electric charge most easily, the other ions waiting their turn in the order of their ease of deposition. Practice has shown that the ease of deposition depends upon the electrode potential of the metal in any particular electrolyte. Thus it is found that the more electro-positive a metal is, the greater is the difficulty in depositing it. Now in a nickel solution consisting of ions H, Ni, Mg, $NH_4$, Na, from the electrode potentials, we know that H has a tendency to deposit most easily. However, by keeping the H ion concentration low (and because of the over-voltage of H upon nickel) we can repress the tendency of H to deposit in favor of Ni ions, which we have present in great amounts. The ions Mg, $NH_4$ and Na also are around the cathode area, but their deposition pressure is high or their ease of deposition is less than that of Ni, because they are more electro-positive. Their presence in the cathode area creates a high positive electro-static charge which the negative charges on the electrode tend to neutralize. But if there exists a sufficient quantity of Ni ions in the cathode area, they alone are attracted, making the discharge of Ni ions rapid, in this way exhibiting not only increased conductivity but also good cathodic current efficiency. This explains why a nickel solution high in metal content, but of only slightly better conductance when compared to another bath can turn out the same deposit in ½ or ⅓ less time.

E. W. Heil in "Reactions of Conducting Salts," at the Cleveland Convention of the A. E. S., asks why a nickel solution of:

16 ozs.....nickel sulphate
6 ozs.....boric acid
3 ozs.....sodium chloride
1 gallon.....water

having a resistance of 48 ohms, should, as claimed by some platers, plate a given deposit in one-third less time than

12 ozs.....nickel ammonium sulphate
1 gallon.....water

having a resistance of 52 ohms. He says this more rapid deposition might be secured by the metal content, certainly not by increased conductivity. The explanation given above, thoroughly explains the difference in the results obtained from these two solutions.

Just as soon as the Ni ion concentration becomes low, the next ion of the easiest deposition is discharged, resulting in lower current efficiency, although conductivity may still be the same, and faulty deposits which might be manifested by peeling, pitting, cracking and curling of the deposit from the cathode.

ADDITIONS OF ACIDS

**Boric acid:** Used in solutions to maintain a small concentration of acidity which general experience has proved is essential to obtain a whiter deposit than can be obtained from neutral or alkaline solutions. It acts in the capacity of a reservoir in keeping up a constant but small concentration of H ions in the solution. Insofar as the properties of nickel are concerned the addition of hydrochloric or sulphuric acid could be substituted for boric, but since these acids are highly ionized, the H ions are rapidly plated out, so that they are not so valuable in maintaining a constant slight acidity of the solution as boric acid is. Besides there is the danger of adding too much of the strong acids causing a low cathode efficiency and a brittle deposit.

**Ammonia and nickel carbonate:** Many of the older formulas recommended for nickel plating the addition of ammonia to render the bath alkaline, but this practice has been found to be unsatisfactory in that the deposits obtained were unreliable and of dark color. Since it has been appreciated that a slightly acid reaction is necessary, ammonia has been used to neutralize excessive acidity. This practice is to be discouraged inasmuch as baths will have sufficient amounts of ammonium salts, and to add ammonia for neutralizing acid is to invite future difficulties. Better that a little more time be taken in destroying acidity, by heating the solution and suspending bags of nickel carbonate, a salt that is decomposed by acids, consequently removing the excess acidity.

**Sodium citrate:** Add to general plating baths in amounts from 1-2 ozs. per gallon for the purpose of preventing sludge formation. Sodium citrate is a solvent for iron and nickel hydroxides and consequently when this substance is present in the solution, the baths remain much clearer. It is a decided benefit in the direct nickeling of sheet zinc and die castings, as it decreases the rate of deposition by immersion of black nickel upon the articles to be plated.

**Magnesium sulphate:** This substance has been generally added to nickel solutions for conductivity purpose. It is the poorest substance that acts in such a capacity. However, that it has a beneficial purpose upon the deposited nickel cannot be doubted, as solutions containing magnesium sulphate are very hard to beat for general utility. P. W. Robinson, in THE METAL INDUSTRY, volume 14, page 187, states that pitting of nickel solutions containing magnesium sulphate is unknown. This statement seems to be well borne out in practice, as nickel solutions that pit (provided the pitting is not caused by excessive acidity or lack of metal), gradually and finally cease to pit upon the addition of magnesium sulphate. Baths containing magnesium sulphate can be worked with a greater range of acidity than baths that are worked without it.

There is no definite theory for the function of magnesium sulphate. It is possible that the presence of more electro-positive ions than nickel that are not discharged is a condition necessary for the deposition of good nickel. Mathers, in the A. E. S. Bulletin, April 1916, says that the addition of sodium, potassium or ammonium salts in large amounts tend to produce dark deposits. This is to be doubted, because experience shows that if a wider range of acidity is used no such effects are noted. In fact the use of sodium and potassium salts allows a greater range of acidity in solution of high nickel concentration.

**This article will be continued in an early issue.—Ed.**

# Dezincification of Brass

## Experiments on the Mechanism of Corrosion. Conclusion*

By RALPH A. ABRAMS, University of Wisconsin

EXPERIMENT 6

Experiment 5 was repeated except that the solution was circulated by bubbling air through it.

**Result:** There was complete corrosion of the brass this time with no deposit of copper on the anode. The result at the cathode was the same as in Experiment 5. This experiment was repeated with the same results.

The results of these experiments are very significant. It is found in Experiment 4 that brass corrodes as a whole when used as an anode in sulphate solution; also in Experiment 6 the brass corrodes completely in chloride solution. In Experiment 5 an apparent dezincification takes place. It must nevertheless be concluded from this that, when brass acts as a soluble anode, both the copper and zinc dissolve in their respective proportions. Experiment 5 is not, as may seem at first glance, contrary to this hypothesis. It is noted that some copper was deposited on the cathode during the action, which means that, for some reason, the rest of it was prevented from getting away from the anode.

It is evident at least from this that there is a tendency for the brass to dissolve as a whole although some factor intervenes. The fact too, that two strips of copper, with a smooth surface between them, were found again indicated clearly that the copper remaining was redeposited (as in Experiment 1) and could not have been left behind as the result of selective electrolytic corrosion in Experiment 5. It is evident that the circulation in Experiment 6 prevents this. In other words the corrosion in Experiment 5 would have proceeded as in Experiment 6, had not something intervened to keep the copper formed directly in contact with the brass so as to cause redeposition. Just what happened will be investigated presently. It is sufficient for the present to have shown that brass acts as a soluble anode in chloride and sulphate solutions.

Admitting then that brass is a soluble anode, if the copper which dissolves at the anode be kept in contact with or away from that anode at the will of the experimenter, it is possible to control whether or not dezincification shall take place. With this in mind Experiment 5 can be explained. A membrane of insoluble cuprous chloride which formed on the brass, kept most of the dissolved copper in contact with the brass thereby causing redeposition. In Experiment 6 when the air was blown through the solution, any cuprous chloride which tended to form would immediately be oxidized to cupric chloride and washed away. If it was an insoluble membrane of cuprous chloride which performed the function of keeping the solution of the copper salt in contact with the brass, then if an electrolyte is used in which the cuprous chloride is soluble, the formation of such a membrane should be prevented and complete corrosion should result. Two such solutions were employed—concentrated hydrochloric acid and a saturated solution of sodium chloride.

EXPERIMENT 7

A brass strip was used as anode in a solution of concentrated hydrochloric acid. Melted paraffin was poured on the surface of the electrolyte to prevent evaporation and water-line corrosion. The cathode was carbon. The current density was 0.25 ampere per square foot. The time of action was 10 days.

**Result:** The brass was completely corroded.

EXPERIMENT 8

Experiment 7 was repeated except that a saturated solution of sodium chloride was used instead of hydrochloric acid. The time was 15 days.

**Result:** Again there was complete corrosion of the brass.

It is obvious from the results that the assumption made was correct. Since the vessels were sealed with paraffin, there was no chance for the air to have any effect. The result was apparently due to the fact that cuprous chloride is soluble in strong chloride solutions, so that there was no membrane present to keep the dissolved copper in contact with the brass. If the dezincification is due to the presence of a membrane, when another membrane instead of cuprous chloride is supplied, then redeposition of copper should again take place.

EXPERIMENT 9

Brass screws were used as anode. They were screwed into white pine saturated with concentrated hydrochloric acid. The wood was used to act as a membrane; the concentrated hydrochloric acid was used as electrolyte to dissolve any cuprous chloride which may have been formed. A carbon cathode was used. The current density was 0.25 ampere per square foot. The surface exposed to air was paraffin to prevent evaporation. The time allowed was 25 days.

**Result:** The screws were found to be copper with a core of brass in the center, which had not yet been attacked. There was no copper at the cathode.

EXPERIMENT 10

A brass strip was wrapped tightly with several layers of filter paper and cheese cloth and bound with string. This was done to have a membrane with which to keep the copper in contact with the brass. This strip was used as anode, and a carbon rod for cathode in a concentrated solution of sodium chloride. The current density was 0.25 ampere per square foot. The time was 21 days.

**Result:** When the strip was examined, the lower half was found to consist entirely of copper, while the remainder had not yet been attacked. Much of the copper from the brass was not held by the improvised membrane, but was deposited on the cathode. The copper left behind was again found in the form of two thin sheets.

These experiments substantiate the contention that, for dezincification to occur, a membrane of some sort, no matter what, is necessary to keep the copper in contact with the brass. In Experiment 4 it has already been seen that brass is completely soluble when used as an anode in potassium sulphate solution. Now, if the results of Experiments 9 and 10 are true, then merely enclosing the brass in a membrane, dezincification should occur.

EXPERIMENT 11

A brass strip, wrapped as in Experiment 10, was used as anode in a 3 per cent potassium sulphate solution as electrolyte with a carbon cathode. The surface of the solution was paraffined as usual. The current density was 0.25 ampere per square foot. The time was 16 days.

**Result:** The strip when removed had a brassy color on the outside, but it was found to be solid copper. This experiment was repeated twice with the same results.

EXPERIMENT 12

An unwrapped brass strip was corroded as anode in a 5 per cent zinc sulphate solution. The surface of the

*A paper presented at Forty-second General Meeting of the American Electrochemical Society held in Montreal, September 21-23, 1922. Part 1 was published in our issue of December, 1922.

liquid was covered with paraffin. The current density was 0.25 ampere per square foot. The time of corrosion was 20 days.

**Result:** The brass corroded uniformly as a whole, with no signs of a copper deposit.

EXPERIMENT 13

A brass strip was treated the same as in Experiment 12 except that it was bound with filter paper, cheese cloth and string to give a membrane effect.

**Result:** The metal remaining at the anode in this experiment was copper and some of the brass which had not been corroded.

Experiments 4 and 12 show that brass is complete corroded when used as an anode in potassium sulphate and zinc sulphate solutions. From Experiments 11 and 13, it appears that the membrane, by keeping the dissolved copper in contact with the brass caused redeposition of copper. Whether the membrane be cuprous chloride, or one artificially supplied, its function is the same, and it produces the same result—dezincification. In general, dezincification may be expected whenever the brass is so wrapped that the dissolved copper is kept in contact with it long enough to redeposit.

It is worth noting that if the only purpose of the membrane is to keep a supply of dissolved copper at the brass then as long as there is a plentiful supply of copper in solution, no membrane should be necessary to produce redeposition. In previous experiments, electrolysis of unwrapped brass in sulphate solutions has never resulted in dezincification.

EXPERIMENT 14

A strip of brass was used as anode in a 10 per cent copper sulphate solution. A current density of 0.25 ampere per square foot was used for 14 days.

**Result:** Pure copper was left at the anode. This experiment was repeated twice with the same results.

EXPERIMENT 15

Strips of brass were placed in separate solutions of cuprous and cupric chlorides for 14 days and allowed to corrode chemically.

**Result:** Only copper remained which again was in the form of two sheets that could be pulled apart. The quality of the copper in this case was as tough and ductile as any copper plate obtained from an electroplating bath.

From these last two experiments, it is seen that as long as there is a plentiful supply of dissolved copper present, redeposition of the copper is obtained in spite of the fact that a sulphate solution is used. This bears out the theory that the function of the membrane is to keep the copper in contact with the brass.

SUMMARY

The so-called dezincification can be reproduced in a few weeks in normal hydrochloric acid just as it occurs in nature in several years.

When the acid is agitated, it is seen that the brass dissolves as a whole.

The two layers of copper found in dezincified brass, can only be explained on the basis of redeposition.

When used as anode, brass dissolves as a whole in surphate solutions and in agitated chloride solutions.

When an insoluble membrane of cuprous chloride was allowed to form dezincification took place.

In an electrolyte in which cuprous chloride is soluble, such as concentrated hydrochloric acid or saturated sodium chloride solution dezincification does not take place.

If another membrane is supplied in electrolytes in which cuprous chloride is soluble, then dezincification again takes place.

An artificial membrane is sufficient to cause redeposition of copper in sulphate solution which ordinarily give complete corrosion.

Finally it was observed that when an adequate supply of dissolved copper was maintained, by using a solution of a copper salt as electrolyte, dezincification was obtained without any membrane whatever.

This investigation was undertaken at the suggestion of Dr. O. P. Watts to whom the author is indebted for many valuable suggestions in the course of these experiments.

# Calcium Sulphide as a Bronzing Agent

## A New Use in the Plating Industry for a Long Known Chemical

Written for The Metal Industry by ARAYEL

The form in which this substance is best adapted to the needs of the metal colorer is the calcium penta-sulphide solution, a deep orange-red colored liquid, manufactured in immense quantities as an insecticide and fungicide for the agriculturist and the fruit grower. It is commonly known as lime sulphur solution. Its cheapness (about 40 cents per gallon for five gallons), the rapidity with which dilute solutions color silver and copper, together with its convenient form of making solutions, makes it a most desirable substance for producing the so-called oxidized finishes.

For oxidizing copper and silver one or two tea spoons full to the gallon of water are ample to begin with, for silver, using the solution hot. By manipulation brass can also be colored with the hot or cold dip. By manipulation is meant the process of intensifying or changing the color of a stain produced by one solution by a subsequent dipping in another. An addition of a carbonate of ammonia, soda or potash to lime sulphur solution will precipitate the lime and form the alkaline sulphide, in solution.

The question might arise in the minds of some readers, "Why, if this substance is good for the use indicated, is it not generally known to platers or in common use?" I do not know. Perhaps the earliest experimenters, who, it appears, had to make many of their own chemicals, found it more convenient to make the potash salt than to boil down a solution of water, lime and flowers of sulphur. Furthermore, when the agricultural chemists found in lime sulphur solution an effective means for combatting the San Jose scale they were not interested in any problems of the plater and thereby overlooked a golden opportunity to place it on the market.

### Acid Resisting Alloy

An alloy developed by Prof. Parr, of the University of Illinois for acid resisting purposes, to be used in calomimeters, acid pumps, etc., consists of the following:

| | |
|---|---|
| Nickel | 66.6 |
| Chromium | 18.0 |
| Copper | 8.5 |
| Tungsten | 3.3 |
| Aluminum | 2.0 |
| Manganese | 1.0 |
| Titanium | .2 |
| Bismuth | .2 |
| Silicon | .2 |

# Metal Finishes

## Various Methods of Coloring and Finishing Manufactured Products

Written for The Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

### BURNISHING GOLD LEAF

Q.—I am desirous of securing some data and information in connection with the burnishing of gold leaf on picture frames.

A.—Briefly mentioned, the application of gold leaf to picture frames is as follows:

The surface for gilding should be smooth and then several coats of a preparatory size made up of a good grade of glue and floated gilders' whiting (preferably English floated whiting) should be applied boiling hot.

The final coat should be a light yellow chrome to which the gold leaf is to be applied. When the sizing coats are thoroughly dry a thin coating of gold or parchment size is applied to the yellow sized surface. When the gold or parchment size is partly dry and still tacky, the gold leaf is applied. It requires skill to apply the gold leaf. A soft brush thoroughly moistened with water should be used to smooth down the gold leaf, or absorbent cotton may be used to smooth down the leaf.

After the gold leaf is applied and when thoroughly dry, it may be burnished for a high lustre by the use of burnishing tools made of wolves' or dogs' teeth, or agate, mounted in steel with wooden handles. The gold leaf must be perfectly dry when being burnished. The motion must be even as the burnishing tool passes to and fro over the gold leaf.

For more detailed information, secure a copy of the Painters', Gilders' and Varnishers' Companion.

### ENGRAVERS' COPPER

Q.—Will you kindly give us the following information:

1st. We should like to know the name of machine you would recommend for the grinding and polishing of copper for engravers' purposes.

2nd. Can a mirror finish be obtained on cold rolled copper, tinned copper, and engravers' copper by the use of Tripoli alone, or must we use a second polishing compound?

3rd. It has been suggested to us that after the use of Tripoli we use ordinary whiting, which will absorb the grease left by the Tripoli and then use jewelers' rouge.

A further suggestion comes from another party, that in order to obtain this full mirror polish the sheet should pass always with the turn of the buff.

A.—Engravers' Copper must be especially selected. It should contain no surface imperfections from rolling. Sheet copper that contains oxide streaks should not be used unless the reverse side of the sheet to the one containing the oxide streaks is used.

We do not know of any particular type of machine that we could recommend for grinding and polishing of copper sheet for engravers' purposes. It is customary for firms in the trade to develop their own polishing apparatus. Some firms have developed machines for polishing sheet zinc, which would be adaptable to your purpose. The sheets are held in a half circle holder of a somewhat barrel-like type. A greater pressure can be brought to bear against the buff wheel by this means than when the platform method is used and the sheets are only brought to bear against the underside of the buff wheel; which is probably the method you use now.

A mirror finish can be obtained on cold-rolled copper, tinned copper and engravers' copper, but not in one polishing operation by the use of the tripoli alone.

The method to pursue would be as follows:

1st. Cut down with tripoli.

2nd. Color buff on a much smaller buff than those used for cutting down with tripoli. A good grade of red rouge composition should be used in the coloring operation.

3rd. Finally use a Canton flannel buff wheel for what might be termed a "wiping operation." Either precipitated carbonate of lime or English gilders' floated whiting can be used in the final operation.

### BLACK FINISH ON BUTTONS

Q.—How can we get a black finish on buttons like the enclosed?

A.—It is somewhat difficult to determine whether the black finish on the buttons submitted to us is a chemical or japan finish.

If the phospor bronze spring is attached after the button has been blackened, then it would indicate that the finish is a japan finish, produced by tumbling in an oblique tumbling barrel. The japan is probably sprayed on the buttons as they revolve in the barrel.

If the springs are not attached after finishing the button then the entire button is bright acid dipped and then blackened in the usual copper carbonate ammonia dip. The dip is prepared as follows:

| | |
|---|---|
| Water | 2 gallons. |
| | Temp. 140° Fah. |
| Aqua Ammonia 26% | 1 quart. |
| Carbonate of Copper | 16 ounces. |
| Carbonate of Soda | 8 ounces. |

To prepare the solution dissolve the soda in the hot water, and the copper in the ammonia, and then mix together. The cleansed buttons should be immersed in the solution for a few minutes, and moved to and fro. As soon as blackened, wash thoroughly in cold and boiling waters and then dry out in hot maplewood sawdust, or by the use of a centrifugal dryer, which eliminates the use of sawdust. To maintain the ammonia dip in constant operation concentrated solution of copper carbonate and ammonia and water should be added.

For japans suitable for tumbling and data covering the use of the same, get in touch with our advertisers. If you desire to lacquer the buttons after blackening in the ammonia dip, any of the lacquer firms advertising in the METAL INDUSTRY can furnish lacquers.

### MATT ON ALUMINUM PLATE

Q.—Could you tell us how to produce the "matt" on the aluminum plate herewith enclosed? We believe it is a chemical matt and that it is done other than with caustic soda and nitric acid.

A.—The indications are that the matt or satin finish upon the aluminum name plate submitted as a sample is done by the aid of a steel satin finishing brush. This type of brush is used the same as an ordinary scratch brush. Any manufacturer of scratch brushes can furnish satin finishing brushes, or wheels as they should be termed.

There is such an article as a satin finishing lacquer. Get in touch with some lacquer firms. They may give some information on this lacquer. Have you ever tried

sand blasting with ground glass with a regular matt surface from the usual caustic soda and nitric acid dips? Ground glass would give a matt finish near to your sample.

### ENAMELING WOOD

Q.—I am sending you, by parcel post, two wooden handles, one white and one black. How can I produce these coatings?

A.—We would suggest that you get in touch with lacquer and enamel manufacturers. They can give you data for its use. The wood before coating with enamels would have to be primed with a thin coat of orange shellac to prevent the wood absorbing the enamels. When dry, the white and black enamels can be applied by either spraying or dipping.

### COLORING BRASS

Q.—How can I get a lasting blue or black on brass?

A.—You can obtain almost any color you desire upon brass by immersing the cleansed articles in a solution of hyposulphite of soda and lead acetate. The following solution will give the desired results: Blue or black—depending upon the time the articles are immersed in the solution.

| | |
|---|---|
| Water | 1 gallon. |
| Hyposulphite of soda | 8 ounces. |
| Lead Acetate | 2 to 4 ounces. |
| Temp. 180° Fah. | |

It will be advisable to lacquer the colors so produced to protect them permanently. For a black finish exclusively, then the usual copper carbonate and ammonia solution will give the desired results.

| | |
|---|---|
| Water | 1 gallon. |
| Ammonia Water 26% | 1 pint. |
| Copper Carbonate | 8 ounces. |
| Sal Soda Crystals | 4 ounces. |
| Temp. 120° Fah. | |

In preparing the solution, dissolve the copper in the ammonia first, then add to the water, then add the soda and mix thoroughly.

The brass articles to be colored should be clean and bright.

### OXIDIZING BRASS

Q.—Kindly advise what simple dip solution, preferably cold, you would recommend for producing a discolor for oxidized surfaces on brass terminals for the object of designation. A quality finish is not as essential as the fact that the process be simple and quick.

A.—If a black color will answer or any tone from golden to blue and black, then the simplest solution that can be used is the following:

| | |
|---|---|
| Water | 1 gallon. |
| Sodium Hyposulphite | 6 to 8 ounces. |
| Lead Acetate | 2 to 4 ounces. |
| Temp. 180° Fah. | |

This solution is not effective unless used near the temperature given. A very thin coat of silver can be given the articles in a cold solution prepared as follows:

| | |
|---|---|
| Water | 1 gallon |
| Sodium Cyanide 96.98% | 2 ounces. |
| Silver Cyanide | ¼ ounce. |
| Soda Ash 58% | ½ ounce. |

The articles to be colored should be clean and bright or as near so as possible. For your purpose the first solution may be used cold as long as you are not particular about results, only a discoloration required.

### GUN METAL ON BRASS

Q.—How can I produce a gun metal finish on brass?

A.—The production of a substantial gun metal finish direct upon brass is not possible, that is, with any wearing qualities.

Manufacturers of such goods usually nickel plate the brass surface first just long enough to obtain a uniform deposit. Then the nickel deposit is coated over quickly by the aid of the silver strike solution, usually composed of the following proportions:

| | |
|---|---|
| Water | 1 gallon. |
| Sodium Cyanide 96-98% | 6 to 8 ounces. |
| Silver Cyanide 80½% metal | ⅓ ounce. |
| Caustic Potash | ½ ounce. |

Use steel anodes at 5 to 6 volts after striking the plate for a few minutes in a regular silver solution afterwards oxidizing by the aid of hydrosulphuret of ammonia.

| | |
|---|---|
| Water | 1 gallon, Temp. 180° F. |
| Hydrosulphuret of Ammonia | 2 ounces or more. |

as may be required to give a rapid gun metal color. As soon as obtained, wash the articles in cold and boiling waters, dry out by the aid of maple wood sawdust, finally scratch brush dry, using a very soft crimped wire scratch brush at 400 to 500 revolutions per minute. Finally lacquer preferably by dip or spray. Use a good grade of combination gum and celluloid lacquer. No. 2 black nickel gives a good gun metal finish but much blacker than the silver gun metal finish referred to.

It is always advisable to nickel plate the brass surface lightly before black nickeling, to prevent the local action of the black nickel solution upon the brass. A sand blasted surface gives a Matt finish. The nickel solution given on page No. 1 of "Platers' Wrinkles" containing 8 ozs. single nickel salts, etc., per gollon, can be used to advantage for both methods. The black nickel solution on page 20 containing nickel chloride and the regular silver solution on page 13 will meet requirements specified. Many other finishes can be produced by the aid of formulas given in "Platers' Wrinkles," of which we enclose a copy.

---

## The Tin Industry

Q.—1. Is there any tin produced in the United States from domestic ore? If so, where and what quantity?

2. What are the amount of tin imported by the United States and the average price paid during 1922 in New York?

3. What are the industries using tin and in what quantities?

A.—1. There is practically no tin produced in the United States from domestic ore.

2. In 1922 the tin imported into the United States amounted to 57,460 long tons at an average price of 32.581c. per pound.

3. The only figures for the consumption of tin are those given below, which were collected by the War Industries Board for the calendar year 1917. This table shows the percentage distribution of tin into the various indus-eries in which it is used. In that year the total tin consumed in this country was about 76,000 long tons.

TIN CONSUMPTION IN 1917

| | | |
|---|---|---|
| Tin and terne plate | About | 36.5% |
| Solder | " | 22.0% |
| Babbitt and bearing metal | " | 14.0% |
| Brass and bronze | " | 6.0% |
| Collapsible tubes | " | 3.0% |
| Foil | " | 5.5% |
| White metals other than above | " | 2.0% |
| Tinning and retining | " | 2.5% |
| Chemicals | " | 2.0% |
| Plated ware, britannia ware | " | 1.5% |
| Miscellaneous (novelties, etc.) | " | 5.0% |

# The Immigration Problem

## One View of the Results of Limiting Immigration Into the United States

Written for The Metal Industry by WM. H. BARR, President of the Lumen Bearing Company and the National Founders Association

The fundamental trouble in the immigration problem is the fact that it has been injected into politics. Any problem of the nation which becomes a point in political manœuvring is seldom satisfactorily settled, and it would seem as if the immigration situation is to continue for a time at least without any proper solution. When the labor unions undertook to build up a great power throughout the country they were wise enough to recognize the fact that a shortage of unskilled labor is the greatest offensive weapon which they can possess. They realized that where there is a normal supply of unskilled labor the power of the union is not so effective because men want to keep their employment and are not so ready to obey the call of the leader who finds that his ability to penalize industry is increased commensurately with the shortage of workers. The first restriction imposed was the literacy test which was, and is, utterly unsound. This country has not reached its full development, and there are still necessary a tremendous number of workers to do the rough labor in connection with the industries and utilities. The literacy test shut out this type of labor to a large extent, and struck at the very root of our development because, unless the foundation work is done, the superstructure cannot be completed. The unions were aided by the old cry that anarchists and communists were coming in too freely, but it was absolutely untrue as applied to illiterate workers. It was the men who could read, write, and orate who were the anarchists and communists, while the stolid, well meaning laborer had no interest in that particular kind of propaganda.

Of course, the union success in forcing the literacy test naturally resulted in reaching out for other restrictions which would limit the amount of labor. Let it be remembered that there was no thought on the part of the unions that the workers who were coming in were either reducing wages or competing with American workers. That was a slogan offered to our people which no unionist leader ever believed. The result of the continuous agitation supported by people who believed that we were not assimilating the immigration that was coming in, resulted during 1917 in the 3 per cent. law which is now on the statute books. It should be understood that it is not at all a net 3 per cent. law in the sense that such a quota is added to our workers every year because emigration is debited against immigration, and in some cases almost offsets it.

We have, therefore, the literacy test which is utterly stupid, and the 3 per cent. restrictive limitation which has succeeded in merely steadily decreasing the number of workers available and particularly at this time when the country is beginning to forge ahead out of the slough of post war depression. There can be no real prosperity, no definite industrial expansion unless there is a sufficient supply of unskilled labor. No one will assert that we have reached today a full measure of prosperity or that our expansion has nearly reached the possibilities which should follow our recent depression. But on the verge of such an advance we find a shortage of all kinds of labor, which will act as the most effective brake that it is possible to conceive. If we are willing to concede increased power to the labor unions with which they may further limit the return of our possible prosperity then, of course, we are heading for economic disaster.

The National Industrial Conference Board points out that a new high point in industrial activity in the United States is noted in a survey of the industrial situations. On the basis of production studies in the principal and basic industries it is shown that the index figure for November, 1922, recorded business which surpassed the previous high points of June, 1918, October, 1919, and March, 1921. How much further shall we progress under the present shortage of labor and the restrictions of the immigration laws? Even those who are responsible for the present immigration laws admit that they have not functioned satisfactorily, but they are doing nothing to make changes which will be effective so long as labor union clamor persists. In the last fiscal year 309,556 immigrant aliens were admitted and 198,712 emmigrant aliens left the country. The net immigration was, therefore, only 110,844, or less than one-third of the quota which it was assumed would be available under the 3 per cent. law. The 3 per cent. law would, in round figures, admit 355,000. Why does not Congress, therefore, immediately open the door? In other words, why is not the law made a 3 per cent. net and the number admitted be properly increased? Such a change would give at least a slight relief and would be in conformity with the original intention of Congress as to the number of immigrants which ought to be admitted. This particular point is one that Congress cannot well ignore, and all the talk about the process of assimilation being too slow can have no application at least to a net 3 per cent. under the present laws. The changes have been rung on the question of absorption without the slightest study of the situation and without the presentation of figures or facts which will give a real view of this question.

I commend to the attention of every American, who is interested in his country, the report made by the National Association of Manufacturers by the Special Committee on Immigration on December 28, 1922. The report presented an exhaustive investigation of the situation and it carries on its face a certificate of thoroughness and fairness.

I desire to make merely one other point. The existing shortage of labor due to the restrictive immigration laws will inevitably result in demands for higher wages and will bring about lessened efficiency. There can be no question as to the certainty of these things and it is equally certain the cost of commodities will correspondingly rise and we shall have an even greater problem in the high cost of living. It will not be merely increased wages which will produce this increased cost in living, but decreased efficiency together with the lack of sufficient labor will produce an economic condition, inevitably causing higher prices and decreased prosperity. Any increase in prices for goods is likely to result in another buyers' strike, such as we experienced not so long ago, and a buyers' strike will surely check prosperity. This is not presenting a theory, but submitting inevitable hard facts. Let those who would dispute such deductions produce any evidence to the contrary, or show by any form of legislation how such a condition can be avoided. Take the immigration problem out of politics, put it in the hands of scientifically trained men and let us have economic laws without the intervention of artificial influences by favored classes who seek their own betterment at the expense of the nation's industries and the nation's prosperity.

# THE METAL INDUSTRY

With Which Are Incorporated

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# EDITORIAL

## DISCUSSIONS AND CONTROVERSIES

In the October, 1922, issue of THE METAL INDUSTRY we published an article by Joseph Haas, Jr., entitled "Electro-plating—Its Past, Present and Future." The subject matter of the article is too long to repeat here in detail, but it was, as stated in the sub-title, an indictment of the typical foreman plater and his attitude toward the scientist. In answer to this article we have received a number of communications, two of which (those from An Assistant Foreman and W. E. Hughes) have been published in our issues for December, 1922, and January, 1923. The other letters received were not written for publication.

It seems necessary at this stage of the situation to state again the position of THE METAL INDUSTRY. We hold no brief for either side of discussions, as we term them. We do not print personal controversies. Our mission is to provide a medium for the distribution of information, and in order to do so fairly and justly, we must open our columns to all sides. To those who have written asking why we permitted Mr. Haas to "slander" the foremen platers, our answer is that Mr. Haas is a plater of reputation and standing. His opinion carries a certain amount of weight, and this opinion, right or wrong, it is his privelege to hold. We published Mr. Haas' opinion as such, and not as the opinion of THE METAL INDUSTRY. In perfect fairness to the other side we have opened our columns to those who disagree with him and permitted them to tell their story. Justice in this case, as in all others, consisted in not suppressing anyone's opinion on the ground that others might object, but in allowing everyone to have his say.

It is true that sometimes discussion may become heated and personal. It is no part of our ambition to have our columns become a field for mud-slinging. So long as the discussion remains just that and confines itself to the topic about which there is a disagreement it should go on. As soon as it lowers itself to personalities, however, it must stop. Sometimes these boundaries are hard to locate accurately. Everyone has a right to hold firm convictions and to express himself clearly. It is, therefore, clearly impossible to say in advance what we can and cannot publish.

Other cases in point are the Churchill-Harper and the Reardon-Cash discussions. All of these gentlemen have very definite opinions which conflict with those held by the others. Naturally a firm belief in one's opinion results in a correspondingly strong disbelief in opposite opinions. These strong disbeliefs were expressed, at times bluntly, but at no time did any personal animosity enter into the matter. There might be disagreement, but no disrespect or enmity.

We suggest, therefore, to all those who disagree with anything that is publishd in THE METAL INDUSTRY, whether it is stated by others or ourselves, that the proper procedure is not to fly into a rage at the publication of such statement, but to send us a plain, frank answer which will have its chance in our columns.

## DEPARTMENT OF COMMERCE AND METALS

The Tenth Annual Report of the Secretary of Commerce covers a number of points of real interest to those engaged in working metals. Through the Bureau of Standards, a Division of Simplified Practice was organized which has as its mission the simplification of specifications of manufactured material. Although these materials include a large number outside of the metal field, the movement is of decided interest to us all and should result in the saving of large sums. The metal bed industry together with some others adopted four sizes of beds of one standard length as the recognized sizes in that particular industry. It was also agreed at the same time that the mattress and spring manufacturers should conform to these sizes agreed upon by the bed industry. Surveys preparatory to calling conferences for the elimination of excess varieties and sizes are now being conducted, hardware, storage batteries and spark plugs, among others.

It is stated that similar opportunities for simplification in dimensional sizes and varieties exist in hundreds of lines, and although the division has been operating for only six months, contacts have been made with more than 65 industries, among which are the following: Electric lighting fixtures, stoves, boxes and food containers, refrigerators, pianos and musical instruments, copper and brass products. It would be well for all manufacturers of metal supplies and parts for these industries to acquaint themselves with the facts of this movement in order to keep their work up with the times.

It is also stated that, in general, these programs tended to reduce the amount of capital tied up in inventories by both manufacturers and retailers and to reduce the unit cost of manufacture by making it possible to introduce mass production methods. It intensifies competition on articles of greatest interchangeability and tends to open up new opportunities for small and specialized manufacturers.

Directly in the field of metallurgy the Bureau of Standards has been engaged in the study of methods of analysis for gases in metals, and the determination of the effect of these entrained gases on the behavior of metals in various stages of manufacture and on the properties of the finished metal products. Work is being done on nickel and Monel metal, malleable iron embrittlement by sherardizing and magnetic estimation of iron in brass. The most important instrumental development was the design and construction of an automatic apparatus for thermal analysis, permitting the elimination of one operator in taking heating and cooling curves.

## IMMIGRATION AND LABOR SHORTAGE

"The most important duty of all of us is to protect our American standards."

In our January and February issues we have published the opinions of several authorities on the subject of our immigration laws and the labor shortage, which at present is of particular importance to manufacturers. We believe that Daniel Bloomfield, of Boston, Mass., who stated the vital point in the expression quoted above was the one who hit the nail on the head. For after all, as he says, the important duty is to protect our American standards.

The first consideration to remember is the political welfare of the whole United States, and to take special precautions that our political and intellectual standards do not deteriorate, as they have shown signs of deteriorating in the past, from the flood of unassimilated immigration.

Those who have written articles on these subjects, that have been published in THE METAL INDUSTRY, are Walter Renton Ingalls, Daniel Bloomfield and W. H. Barr. They have mentioned, more or less, the importance of maintaining American standards, and have also set forth the need of labor in the manufacturing industries. So ultimately we hope we may have an immigration bill which will do both—first, protect American standards, and second, give the labor supply desired. This in the last analysis will mean a really selected immigration, as we had the selected draft in the great war.

## ANTI-SPRAY PAINTING LEGISLATION

We have received a communication from the De Vilbiss Manufacturing Company, of Toledo, Ohio, to the effect that legislation is pending against the use of spray-painting machines. It is stated that a bill has already been introduced before the Minnesota Assembly and is now in committee; also that plans have been laid to introduce similar bills in Wisconsin, California and New York.

It is charged that this is a labor move disguised as a health measure. Affidavits are asked for, testifying to the time and labor saved by these machines and also to the health conditions incident to spray painting.

So far, we have been unable to get any further information in this matter, but are investigating it from both sides, and will present the results as soon as possible.

# New Books

**Les Metaux Precieux, by Jean Voisin, engineer-chemist. Preface by M. Hanriot, Director of Assays at the Mint, Paris. One octavo volume, 264 pages with 88 figures, stitched, paper bound, 25 francs. Flexible binding, 35 francs (published under the patronage of the Union of the Chemical Industries of France and of the Society of Chemical Industry, at the Librairie, J-B. Bailliere et fils, 19, rue Hautefeuille, Paris.**

I could hardly find word to give the reader a better conception of this valuable work than to make use of M. Hanriot's own phrases in expressing my views: M. Voisin presents to the public today a work upon the precious metals looked at altogether from the point of view of their properties, of their industrial applications and of their functions.

This work arrives at its own best hour; the industrial and commercial panic that the war has left in its wake has for a noticeable part its origin in the considerable fluctuations which have subjected the value of the precious metals considered until now as the only sign of monetary stability.

The latter view has been forcibly abandoned since the war by those countries which were unfavorable to the change, for they have substituted a purely fiduciary money for them. It was therefore important to specify what was the origin of these metals, their means of extraction and purification, finally to know the producing capacity of various countries.

In order to complete that study it was necessary in addition to define their actual employment, as it is of the balance between their production and their utilization which results from the variations of the market price of their materials.

M. Voisin has joined this brief study of their physical and chemical properties to their assay methods as well as to the stamp which guarantees their standard and their commercial circulation. This work should therefore be in the library of all those who are occupied in working the precious metals; there will be found assembled in it the most important ideas relative to these metals and thus enable them to avoid the tedious search of scattered documents in various scientific publications.

Its table of contents refers to the physical and chemical properties of gold, how the metal occurs in nature; the mining regions and their production. Methods of searching for auriferous minerals and their treatment and refining. In the same way, in detail the facts are stated succinctly about silver and all of the metals of the platinum group. Also there are interesting data about the various kinds of moneys of the world and medals made of the precious metals. Its bibliographical index is of unusual completeness. The whole work is written in such clear classic French, with simple phrasing, and the avoidance of complex idioms or trade argot that almost any one can read it and understand it at sight. Metallurgically and from a practical foundry point of view the little book is an 18 carat gem. Its illustrations are clear and comprehensible, its diagrams are a credit to the line draftsmanship of the artist who worked them out. The figures and statements made are authoritative without exception. It is a pleasure to read a work of this description where its pages have not been padded and defiled by references to patented composition and formulæ whose statements shock you by their extravagant claims and beggar your belief by their absurdity.—R. E. Search.

**Grinding.** Published by the Norton Company, Worcester, Mass. Size 5" x 7", 387 pages. Price payable in advance $1.00. For sale by THE METAL INDUSTRY.

This book represents the co-operative efforts of the various experienced men of the engineering, manufacturing and executive staffs of the Norton Company. Their principal object in publishing this book was to make available for those interested in grinding information concerning up-to-date practice.

The book covers broadly, wheels, machines and methods in detail. It goes into the following subjects: Abrasives; manufacture and selection of grinding wheels; hand and semi-precision grinding; tool and cutter grinding; machines for precision grinding; the cylindrical grinding machine; efficient production of cylindrical work; steady-rests; form grinding; plane surface grinding; polishing and lapping; devices for truing and dressing grinding wheels; care and safe use of grinding wheels.

**Gantt Chart,** by Wallace Clark. Published by the Ronald Press Company, New York. Size 6" x 8½", 157 pages. Price payable in advance, $2.50. For sale by THE METAL INDUSTRY.

This valuable work is detailed explanation of the "working tool of management" devised by the late H. L. Gantt. At the beginning of the book the principle of Gantt chart is stated, namely, that work plan and work down are shown in the same space in their relation to each other and in their relation to time. It covers in detail the principles; the application and use; the machine record chart; man record chart; layout chart; load chart; progress chart and an actual example in the form of a chart of the American Merchant Marine.

The book is invaluable to the practicing engineer or to the plant manager. It is needless to add to this that it is also invaluable to anyone aspiring to these positions. It is simply and clearly written and is, therefore, useful also to the student.

**Name & Subject Index to the Journal of the Institute of Metals (Volumes 1-XXV).** Published by the Institute of Metals, 36 Victoria St., London, S.W.1, England. Size 5½" x 8", 504 pages. Price payable in advance 25/9. For sale by THE METAL INDUSTRY.

This contains 20,000 references, and covers metallurgical work done between the years 1909 and 1921, the Index Volume is intended to meet the requirements of:

(a) Users of non-ferrous metals and alloys.
(b) Manufacturers of non-ferrous metals and alloys.
(c) Persons engaged in research, teaching, or other spheres of work connected with non-ferrous metallurgy.

# CORRESPONDENCE and DISCUSSION

**Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein**

## PLATING—ITS PAST, PRESENT AND FUTURE

To the Editor of THE METAL INDUSTRY:

In reading my METAL INDUSTRY for January, I came across a criticism of Joseph Haas, Jr., for having written the article "Electroplating—Its Past, Present and Future." You have printed criticism of Mr. Haas. Will you print some praise?

I wish to state that I had never met Mr. Haas prior to meeting him through an advertisement he had placed in a New York newspaper relating to the formation of a class in the Electro Chemistry of Electro-plating. I had long been looking for an opportunity to understand the whys and hows of electro-plating. Consequently, I answered the advertisement and was one of those who went through the course as outlined by Mr. Haas. I must say that through his patience and clearness of explanation I am able to maintain my solutions much more economically for the firm and with more pleasure in working for myself. The knowledge and understanding of the reactions that take place in plating solutions increased my knowledge of plating in general and aided me in my work in the plating, polishing and buffing. The ability to analyze plating solutions has saved my firm considerable money for the year 1922.

I have never been a know-it-all, nor have I been a slouch, as I have worked all over the country for 28 years at plating and polishing as journeyman and foreman. Mr. Haas stated that there was very little to be improved in the plant, as I had put it up, after he had visited my plant and in giving me practical instructions in laboratory work.

I believe that most critics of Mr. Haas have not gotten his meaning. He was rather blunt, but his meaning can easily be seen. He says, "Come on, fellow-platers, get together and show the manufacturers that we represent a class of workers that command respect through knowledge." Mr. Haas has seen, as all must see who possess a knowledge of electro-chemistry, that there are big prospects in the plating industry. He has been willing to take the lead for improvement, and should not be criticised as he has been. Mr. Haas should be given credit for what he has written, as few would have had the courage to write such a plain article. Mr. Haas is young, but that does not mean that he cannot know something that older heads do not. I am 45 years old and was glad to have his assistance and advice.

Mr. Haas has described the platers' helpers correctly. The first evening, when he was explaining the purpose of the course, most of those present found more interest in knocking than in deciding to take the course. When one wishes to achieve a certain amount of success, it takes effort and hard work. I will admit that a plater's job is not a pleasant one, but it can be made a lot better, if we only use our brains and strive to better conditions. The plating industry has room for many better conditions.

If platers would only be able to explain intelligently to manufacturers how they could save chemicals, increase production and lower costs with the aid of a testing laboratory, the manufacturers would quickly realize that the saving would mean a great deal to them. It would surely mean a few more dollars to the platers and hundreds of dollars to manufacturers. Of course, platers who cannot use a testing laboratory cannot show any benefit from its use.

My employer bought me a testing laboratory when I explained to him how he would be benefited. The expense of the laboratory was saved in decreased chemical costs and increased production.

I hope that in the future the readers of THE METAL INDUSTRY will look more deeply into the writings of those who want to spread knowledge, instead of merely glancing over it and getting all "het up." They see only chances to criticise. I myself am against letter-writing, as there is always the possibility of a wrong impression, but in justice to Mr. Haas, whom I know now very well, and understand his feelings and hopes for the plating trade, I feel obligated to write this letter. Hoping that you will publish my first and last communication to any journal, I remain a nine-year subscriber to THE METAL INDUSTRY.

CHARLES HEINES.

NEW YORK, N. Y.
January 27, 1923.

## PHONOGRAPH RECORDING BLANKS

To the Editor of THE METAL INDUSTRY:

THE METAL INDUSTRY for July, 1921, volume 19, No. 7 contains a most interesting and instructive article on wax and wax compounds by Samuel Weyn. In a formula like that of the author on page 276 wherein a saponification of stearic acid is to be effected with caustic soda, should the soda be dissolved in water or is it better to introduce the soda and lead (if any is used) in the dry form?

I have never been able to obtain any ozokerine which when alloyed with paraffine would produce anything like a recording wax, and would like to find out the grade and source of supply of an ozokerite wax for this purpose.

HUGH L. THOMSON.

Meriden, Conn., December 16, 1922.

To the Editor of THE METAL INDUSTRY:

Please be advised that the Mitchel-Rand Co., on Vesey street, and the John S. Lamson & Bros., Inc., 100 John street, both of this city, also the Union Chemical Co., 27 Haymarket Square, Boston, Mass., are dealers in the particular Ozokerite used for phonograph and electrotyping purposes asked by your correspondent.

The whole "trick" in making phonograph recording blanks lies in the experience of the individual making such a blank. He cannot secure it by reading articles in any trade paper.

To saponify stearic acid irrespective of the purpose for which it is intended, the usual procedure is to dissolve the caustic soda in as little water as possible, thereafter adding the stearic acid in small quantities at a time, in order to permit absorption therein; with, of course, the usual continual stirring. Thereafter, the entire mass is heated until no more steam is given off. It is then complete.

Personally, I don't like lead salts in recording blanks, simply because of the fact that the mass has a tendency to absorb moisture.

SAMUEL WEIN.

New York, December 22, 1922.

## PLATING PROBLEMS SOLVED

To the Editor of THE METAL INDUSTRY:

Owing to the recent holiday which allowed me to enjoy the week end at the home of friends, I have until now been unable to write and thank you for the very useful information, the substance of which I discovered in your kindly letter of November 27. If anything ever arrived in the nick of time I'll say it was that letter. Just that very morning I had cleaned the copper solution tank, putting back possibly half of the old, and adding fresh water, hoping that by reducing the density I might again bring out a light color.

"Nothing doin'." The next batch of work came just as dark and gloomy, and it being a busy day I began to experience a feeling of gloom myself. Then, Presto! Along came your letter, and I then knew why my old pal—nearly two years ago—bought that 10 lbs. of Bicarbonate of Soda. I immediately used some and the copper solution lost some of its redness. Another application and the desired results were realized.

My shade gold solution is responding to the nickel cyanide. Why I used to be able to do Old English work in my shade solution, thus you can realize how yellow it must have been. I am using 4 iron anodes about 2½ x 4¾ and a trifle over 1/16 in thickness. Shall use the nickel anode now, along with the others. Allow me to also thank you for sending Platers' Wrinkles. This is a clever little booket, and I feel that with this and the letter of advice I am receiving far more than these mere thanks can repay. Thanking you again most heartily, I am,

EDW. T. FENNER.

Swansea, Mass.
January 15, 1923.

# SHOP PROBLEMS

**IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE**

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. REARDON, Foundry; PETER W. BLAIR, Mechanical; LOUIS J. KROM, Rolling Mill; CHARLES H. PROCTOR, Plating-Chemical; R. E. SEARCH, Exchange-Research }

## ANTIQUE SILVER

Q.—How can I produce an antique finish on silver?

A.—To produce an antique finish upon silver or silver plate equal to your sample, barium sulphide solution will no doubt give the best results. Brown tones can also be produced upon brass from the same solution if used hot and strong.

Prepare a solution as follows:

Water .....½ gallon. Temp. 180° Fah.
Barium Sulphide ..... 1 lb.

When cold, bottle and use for a stock solution.

For use, add just so much of the stock solution to each gallon of hot water at 180° F. to give the color desired. The addition of caustic potash to the solution for coloring brass is desirable as it aids in the development of the colors more readily. From two to four ounces of the potash may be used per gallon of solution if found necessary.

If the brown tone upon the brass is not dark enough and something near the burnt brass tone is required, then the following mixture is advisable.

Mix to a creamy paste, golden sulphuret of antimony with ammonia water 26%. Into this paste immerse the brass articles to be colored for a short time, then remove, wash and dry. The so termed English burnt brass finish will result. The brown finish should be buffed through to the brass to show in relief.

This finish is being used extensively upon period furniture now so much in vogue.

As a rule the burnt brass finish is not lacquered.—C. H. P. Problem 3,164.

## CASTING THIN ALUMINUM

Q.—We are making light aluminum castings, weighing from two to three pounds each, the walls of which are 1/10 of an inch thick. These castings look perfect when they are sent to the buffing department, but as they rough grind them, small holes develop—apparently gas pockets. This work is highly polished and of course the slightest defect sends them to the scrapping. We are melting in iron pots, which are cleaned every morning and coated with lime. Our pouring temperature is between 1,300 and 1,400 degrees.

A.—In solving this problem we would first look to the grade material that is used. We would eliminate any thing but new metal. Very often the scrap and 12 inch ingot offered by dealers is nothing but re-run skimmings and dross, and scrap of undesirable character. This is not desirable. We would make a hardener of 50 parts aluminum, 50 parts copper and pour in ingots, and use as follows:

Melt 84 parts aluminum and add 16 parts of the hardness and melt quickly and pour at a temperature as low as will run consistently and not over 1,300 degrees Fahr.

Pin holes in aluminum are caused by pouring castings at too high a temperature, at a temperature of 1,500 degrees.

Fahrenheit aluminum alloy will take up a large amount of gases which are held in solution and given off in solidification. These gases cause the pin holes.

Quick melting and the use of virgin metal and a small amount of some good deoxidizer will lessen your trouble. We suggest as a deoxidizer a small piece of chloride of zinc be added just before pouring. Do not add the deoxidizer until the metal is cooled down to the pouring temperature.

It is not as bad to over-heat the metal in the furnace as it is to pour at too high a temperature. It would pay to pour at a temperature as low as possible even though you may lose a few castings.—W. J. R. Problem 3,165.

## COATING IRON AND BRASS CASTINGS

Q.—We have experienced difficulty in coating malleable iron and brass castings. Our procedure is as follows: Sand blast or tumble, sulphuric acid pickle, wash in hot water, dry and heat on hot pan, immersion in pot containing the solder mixture, with a zinc chloride flux on top of solder and covering but half of the surface. The castings are pushed through the flux, under a bar partition into the clear solder mixture; the temperature of solder is 700 degrees F., allowed to remain in the solder for about five minutes (long enough for castings to attain the same heat as the solder) dipped in hot water and then cold water. Castings and tubing have a scabby and rough galvanized appearance and are heavily coated. A heavy scum forms on top of solder bath which requires constant cleaning. We can start with a clear pot of solder and after dipping about 200 brass pieces the solder gets a sluggish scum on its surface.

We have had this trouble with both new 60-40 solder and remelt solder and at different temperatures.

A.—Your trouble in this case is probably due to the metal becoming too hot, or the flux on the surface of the molten metal becoming dirty, due to dross which forms very quickly if the metal is heated too much. Keep the surface clean and do not allow the dross to cling to the article when withdrawing from pot.

When the flux on the bath becomes too thick, it must be removed, although glycerin is used for thinning it. The addition of a small amount of phosphor tin may also be tried. You can also get rid of the excess solder by placing the work after tinning in a grease pot for ten minutes. Have the pot full of whale oil tallow or some other high flashing oil and heat as hot as possible, so the excess of solder will be drawn off the work.

You can also clean your tin bath of dross by poling the bath with green poles or use a potato, push to the bottom and let the metal boil and skim off the dross and add a small handful of rosin.

The main cause of your trouble appears to be oxidized metal, and it may be caused in your remelt from radiator drippings. We suggest you refine your remelt before using, by melting in an iron pot and poling and boiling with raw potatoes, or green wood until the metal will run in a strip ¼" x 18" long, very clean and full.

You may use a small amount of sulphur as a flux, or rosin and sulphur mixed.—W. J. R. Problem 3,166.

## COPPER FINISHES

Q.—How can I get the following finishes on copper: gray and chocolate?

A.—The nearest approach to a good gray finish that you can get on copper is to sand blast the copper with powdered glass or very fine glass silica sand. Then nickel plate in a regular type nickel solution containing an excess of common salt. You can experiment with a gallon or two of your regular solution. Add about 6 ozs. of salt per gallon.

A satin finish dead lacquer should be used to lacquer the gray finish so produced. A great deal of care is required in handling satin nickel finishes as finger marks and stains are not readily removed by cyanide dips.

We presume you have tried liver of sulphur, etc., to produce the dark red chocolate finish you desire. Try the following: In 1 gallon of hot water dissolve 2 lbs. of sulphide of barium, when cold bottle it for a stock solution. To every gallon of water to be used as an oxidizing solution add 2 ozs. of the stock solution or more if necessary. The solution should be maintained at 180 to 200° F.

Copper plate the brass parts in a hot copper cyanide solution for a few minutes, then remove, wash in cold water and immerse in the oxidizing dip as outlined until they turn a deep chocolate brown. Now rewash and dry out carefully in maplewood sawdust, afterwards scratch brush dry, using worn brass wire scratch brushes preferably of the crimped wire type. The softer the brush the better the finish. Finally lacquer as usual. These two methods should give you the finishes you desire.—C. H. P. Problem 3,167.

## PERMANENT MOLD CASTING

Q.—Our problem is as follows: We want to make a mold out of paris plaster or some other substitute (we have used Kieselguhr in combination with paris plaster) into which we can then pour a low melting point metal and make a female die block which will weigh approximately from one hundred to two hundred pounds. We have been using what is known as die casting metal 85% zinc, 11% copper and 4% aluminum. There is no necessity for adhering to any particular formula as we merely want a metal which can be melted in the ordinary machine shop instead of going to a foundry.

Our difficulty has been that we cannot get a smooth surface casting. Our molds have been made in such a way that it is poured upon with the bottom side of the die on the top, and the face side down against the plaster mold.

This seems an easy proposition as the mold is open, and we do not care whether the bottom side of the die shrinks or not. We do not care whether the face is smooth or not, but the cavity of the female die we want so smooth that no further polishing or machine work is necessary. A surface similar to the ordinary die casting is what we are after.

It is not necessary to make more than two castings from any one mold and if we cannot get two we would even be satisfied with one; in other words, the permanency of the mold is not essential.

We have baked the molds up to seventeen hundred degrees and poured our metals while the molds were warm, and judging from the manner in which the metal lay in the mold cavity there is no moisture left in the mold. However, that part of the metal on the bottom against the mold was honeycombed and apparently gas had been trapped and could not get out.

With the above information you can probably see what we are after, and can outline the procedure in a minute detail.

Our female die blocks are customarily about ten inches wide, fourteen inches long and four to five inches thick.

We have used fine French sand with a surface coating but this weight of metal apparently eats into the sand and does not give us the surface we are after, nor is the sand as easy to handle as the plastic would be.

A.—In answering your letter, we wish to state that we do not quite understand what you are trying to do. If you would send us a sketch of your die and mold, we may be better able to understand your problem.

However, we assume that you are trying to cast a female die in a plaster mold, weighing from one to two hundred pounds, approximately ten inches wide, fourteen inches long and from four to five inches thick. The mold is open, if we are correct in our analysis of your letter.

We do not think a satisfactory casting of the above weight can be made in a plaster mold, and we would suggest a plaster cast of the mold be taken, and cast in bronze. For this we would suggest a mixture of 90% copper and 10% aluminum be used, and this mold used for casting the alloy as the manner of gating and pouring is very essential.

We would like to have a rough sketch of the die and article to be manufactured and we will then be able to give our ideas as to how we would mold gate and the composition best suited for the work.—W. J. R. Problem 3,168.

## PRODUCING A CRYSTALLINE SURFACE

Q.—We are writing to inquire if you can advise us as to an etching solution which will produce a crystalline surface on sheet zinc analogous to that produced on brass by the action of an agitated sulfuric acid-bichromate solution.

A.—We doubt if you can produce a "crystalline" surface on sheet zinc analoguous to that produced upon brass by an agitated sulphuric acid-bichromate solution.

You might experiment with the following formulæ:

| | |
|---|---|
| No. 1. | 1 part Nitric |
| | 3 parts Water |
| No. 2. | 10 parts Hydrochloric Acid |
| | 2 parts Chlorate of Potash |
| | 88 parts Water |
| No. 3. | 2 parts Sulphate of Copper |
| | 3 parts Chloride of Copper |
| | 8 parts Hydrochloric Acid |
| | 64 parts Water |
| No. 4. | 4 parts Hydrochloric Acid |
| | 1 part Nitric Acid |
| | 16 parts Water |

Zinc etchers use perchloride of iron toned down with sodium bichromate. Others use dilute solutions of hydrofluoric acid or sodium fluoride slightly acidulated.—C. H. P. Problem 3,169.

## PICKLING FIRE SCALE FROM STEEL

Q.—How can I remove fire scale from steel?

A.—To remove fire scale from steel by pickling use the following solution:

Water .....1 to 1½ gallons
Hydrofluoric Acid .....3 to 6 ozs.
Temperature 180° F.

If it is necessary to neutralize before going ahead with the material, this can be done in a solution of lime and hot water; afterwards wash off the lime water, dry and go ahead.—C. H. P. Problem 3,170.

## REMOVING ENAMEL

Q.—I am forwarding to you under separate cover a piece of Vitreous Enamel.

The company who I am with has been trying to develop a solution which will remove the enamel by the aid of electric current. I have done some work on this, however the results has not been satisfactory.

If in your judgment there is an acid solution which can be used in connection with a standard generator set, please advise me.

A.—In our estimation a solution of hydrofluoric acid will give the desired results with electric current. It is possible that a very strong current at not less than 6 volts would aid in the removal of the vitreous enamels more rapidly than by simple immersion in a solution prepared from the acid.

We would suggest a wooden tank, lead lined, with the seams burned in. The tank could be so connected that either positive or current could be used as found the most practical in the removal of the enamel. The tank should be arranged with lead pipe steam coils. It is possible with heat a more dilute solution of acid can be used. The cathode poles would have to be well insulated from the tank to prevent short circuiting. We would suggest that you prepare your reducing solution upon the basis of:

Water .....1 gallon. Temp. 120° F.
Commercial Hydrofluoric Acid...1 pint

The acid may be increased as found necessary. The current should be tried both ways, the articles to be stripped of the enamel becoming either anode (positive) or cathode (negative). Naturally the tank would have to be connected with the negative or positive current accordingly.

It is possible that the direct current as in plating will give the best results. The lead tank positive and the article to be stripped negative. A copious evolution of hydrogen beneath the enamel would practically blow off the enamel.—C. H. P. Problem 3,171.

## WHITE FILLER FOR BRASS

Q.—We would like to fill in the gradations made on brass with a white pigment, previous to grinding and oxidizing. The oxidizing solution is made up of ammonia and copper carbonate. What do you suggest?

A.—To overcome the trouble you experience with your present methods, we suggest the following:

1. Grind the surface of the brass as you do now, then oxidize and lacquer.

2. When the lacquer is dry and hard apply a white pigment made up from dry zinc white and water glass or zinc white and gum arabic solution.

The excess of either pigment can readily be removed with water. The ammonia copper carbonate solution has a reducing action on pigments so better and more substantial results will be obtained as outlined.—C. H. P. Problem 3,172.

# PATENTS

## A REVIEW OF CURRENT PATENTS OF INTEREST

1,428,909. September 12, 1922. **Electric Furnace.** Ivar Rennerfelt, Djursholm, Sweden.

In an electric furnace having an upper chamber, a lower chamber, with poorly heat conducting walls, a heat conducting partition between said chambers and means for heating the lower chamber electrically the combination with each other of at least two electrodes projecting into the lower chamber, for the purpose of generating an electric arc in the lower chamber.

1,431,395. October 10, 1922. **Coating of Metals with Metals of a Lower Fusing Point.** Harry Gregg Grinlinton, North Sydney, New South Wales, Australia.

In the coating of metals such as copper or brass or their alloys with tin, applying a dressing of tin in a fine state of division with a suitable medium to the foundation metal, sprinkling powdered stearic acid as a flux over the area dressed, applying heat until the coating metal is totally fused but prior to the complete volatilization of the flux and then wiping the fluid coating metal with a cloth or pad substantially as described.

1,431,686. October 10, 1922. **Induction Furnace.** Wilhelm Rohn, Hanau, Germany.

An induction furnace consisting of an annular melting-channel which is surrounded on all sides also above as well as below the channel by the primary coil and both the melting-channel and the primary coil are surrounded on all sides by annular shaped transformer iron.

1,431,803. October 10, 1922. **Feeder for Ingot Molds.** Bloomfield H. Howard, Washington, D. C., and Ernest J. Turner, Pittsburgh, Pa.

A feeder for ingot molds comprising a body portion of metal reinforced refractory material.

1,431,713. October 10, 1922. **Alloy.** Joseph O. Whiteley, York, Pa., assignor to the Dentist's Supply Company, a Corporation of New York.

An alloy of gold and platinum in which the gold content is from 20 percent to 35 per cent of the whole.

1,432,607. October 17, 1922. **Alloy.** Foster Milliken, Lawrence, N. Y.

An alloy consisting of the following ingredients in substantially the following proportions: Copper 60 to 70 per cent, nickel 9 to 12 per cent, zinc 19 to 24 per cent, iron 1 to 2½ per cent and a trace of manganese.

1,432,803. October 24, 1922. **Process of Making Tubes.** David L. Summey, Waterbury, Conn., assignor to Scovill Manufacturing Company, a Corporation of Connecticut.

The process of producing brass tubes which consists in forming wrought billets containing above 62½ per cent copper and manipulating the wrought billets to form them into tubes.

1,433,302. October 24, 1922. **Sand-Blast Machine.** Edwin E. Rothchild, New York.

The combination with a sand tank having a discharge opening in its lower end; of a fluid pressure supply line extending downwardly into said tank and having radiating pressure discharge arms, the latter being provided with downwardly driected nozzles at their free ends.

1,433,408. October 24, 1922. **Process for Treatment of Metals.** Fred Palmer and Frank Palmer, Spokane, Wash.

A liquid bath for treatment of metals comprising sodium sulphate, salt, potassium ferrocyanide and water.

1,433,618. October 31, 1922. **Metal Anode for Electrodeposition and Process of Producing Same.** George B. Hogaboom, New Britain, Conn., assignor to Scovill Mfg. Company, Waterbury, Conn.

A metal anode for electrodeposition, the corroding rate of which has been improved by producing a variation in the crystalline structure of the metal, from that presented by the metal in its cast, roller or electrolytic form.

1,433,736. October 31, 1922. **Electrolytic Apparatus.** Ralph D. Mershon, New York.

In an electrolytic apparatus, a tank, electrodes and electrolyte therein, means for propelling the electrolyte through the electrodes and means for delivering the electrolyte to the electrodes at a velocity, which is substantially uniform throughout the cross section of the path at the point of such delivery.

1,434,124. October 31, 1922. **Metal Polish.** George W. King, New York, N. Y.

A metal polishing compound composed of one gallon of water, two pounds of powdered tripoli, one pound of infusorial earth, eight ounces of oxalic acid, one-half teaspoonful of liquid sassafras, one-fourth teaspoonful of jeweler's rouge.

1,434,246. October 31, 1922. **Alloy Metal.** Abel S. Hatfield, Wheeling, W. Va.

An alloy metal comprising cobalt, molybdenum and tin in which the cobalt predominates and the percentage of molybdenum is more than double that of the tin.

1,434,395. November 7, 1922. **Electric Furnace.** William Meinersmann, Elizabeth, N. J., assignor to Metal & Thermit Corporation, Chrome, N. J.

In an electric furnace, the combination of a roof, a hearth, means for charging said furnace with a metal, means for withdrawing said charge of metal, means for withdrawing slag from said furnace, one or more fixed electrodes associated with said furnace, one or more moving metal electrodes formed of compressed scrap metal and associated with said furnace, electrical connecting means between said moving electrodes and said fixed electrodes, said connecting means forming the secondary circuit of the transformer, and means for supplying an alternating current to the primary circuit of said transformer.

1,434,798. November 7, 1922. **Process of Making Nickel-Plated Halftone Plates.** Earl E. Stafford, Indianapolis, Ind.

The process of making a nickel-plated half tone plate, which process includes over-etching a copper plate to an extent equal to the desired thickness of the proposed nickel plate, and then nickel plating the same.

1,435,211. November 14, 1922. **Electric Furnace.** Ora A. Colby, Irwin, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pa.

In an electric furnace, the combination with a container, of a resistor comprising solid blocks of refractory electrical-conducting material beneath, and adapted to support, said container, terminal electrodes and a mass of electrical-conducting granular material interposed between each of the electrodes and the resistor to prevent overheating of the electrodes.

1,435,260. November 14, 1922. **Method of Producing Tin-Coated Sheets.** John B. Russ, Shelton, Conn.

The improvement in the method of coating a cuprous metallic sheet with tin which consists in electrolytically depositing thereon a coating of tin of substantially the desired thickness and subsequently subjecting the coated sheet to a modifying heat somewhat below the melting point of tin.

1,435,875. November 14, 1922. **Electroplating with Alkaline Bath.** Chas. H. Proctor, Arlington, and Christian J. Wernlund, Woodbridge Township, Middlesex County, N. J., assignors to the Roessler & Hasslacher Chemical Company, a Corporation of New York.

The method of zinc electroplating in a bath containing cyanide which consists in making the article to be plated the cathode, and providing an anode containing a substance which enters into the bath and increases the over voltage of the cathode.

1,436,464. November 21, 1922. **Machine for Treating Metal Strips.** August Sundh, Hastings-on-Hudson, N. Y., assignor to Sundh Engineering & Machine Company, Philadelphia, Pa.

In apparatus of the class described, the combination of sets of rotatable brushes, one set being of coarser material than the other, means for rotating said brushes, means operable independently of the means last mentioned for simultaneously drawing several strips between said brushes, and against the direction of rotation of the brushes, the brushes being arranged so that the coarser brushes are engaged by the strips before the finer brushes.

# EQUIPMENT

## NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

### SAFETY CARBOY HOLDER

A new safety carboy holder has been placed on the market by the Safety Carboy Holder Company, 340 West Forty-second street, New York.

This safety carboy holder was invented for the purpose of giving the handlers of carboys containing all kinds of dangerous acids a safety device at a low price, allowing the smallest purchaser of carboys to own one. A factory has been equipped with special automatic machinery to build these holders. The claim is made that they will pay for themselves in three months' use, on the ground that they will do with one boy what used to take two strong men's time. There is no tipping a carboy over a block with the risk of slop, waste, burning and the liability to damage suits by the workmen. A fifteen-year-old boy can draw the contents of a carboy as accurately drop by drop as by the gallon. It can be locked in an upright position when not in use so that anyone carelessly leaning on it cannot swing it either way.

POURING ACID—OLD STYLE

The most important claim put forth by the manufacturers is that when the carboy is locked upside down the acid that is obtained by draining all the contents, such as the acid sticking on the face of the glass, will pay for one of these holders in a very short time, as this varies from one to three pints out of each carboy drained. By test it has been shown that it takes 20 minutes holding a carboy upside down to get all the drainage, and no man, even if he is strong enough, is willing to do it. With this holder, however, by placing a pitcher or pail under a carboy, locked upside down, it can remain there as long as the owner desires.

The clamps and stand are adjustable to fit any size carboy; they can be put on and ready for use in 60 seconds. They are made of the best of steel, enameled in black, and, it is claimed, cannot be broken. "Will last a lifetime." When in use the stand occupies a floor space of 26 by 23 inches. It is guaranteed to carry 500 pounds with safety. Total weight in shipping condition, 40 pounds.

POURING ACID WITH SAFETY HOLDERS

### ANNEALING FURNACE

Charles F. Kenworthy, Waterbury, Conn., has made a number of installations of the Kenworthy car-type non-oxidizing annealing furnace. The heating unit consists of a heavy steel platform car, carrying a steel annealing chamber, sealed at its bottom end by extending downwardly into the water with which the sealing tank is filled.

The annealing chamber, heated by an externally surrounding combustion chamber, is provided with a small steam jet which drives out any entrained gases, through a special valve at the top.

The sealing tank which is longer than the heating unit, is covered with heavy steel doors, hinged at either side of the heating unit, which are automatically raised and lowered as the furnace travels back and forth, thus covering the exposed part of the sealing tank and at the same time, providing a platform for the operator, while loading and unloading the elevator.

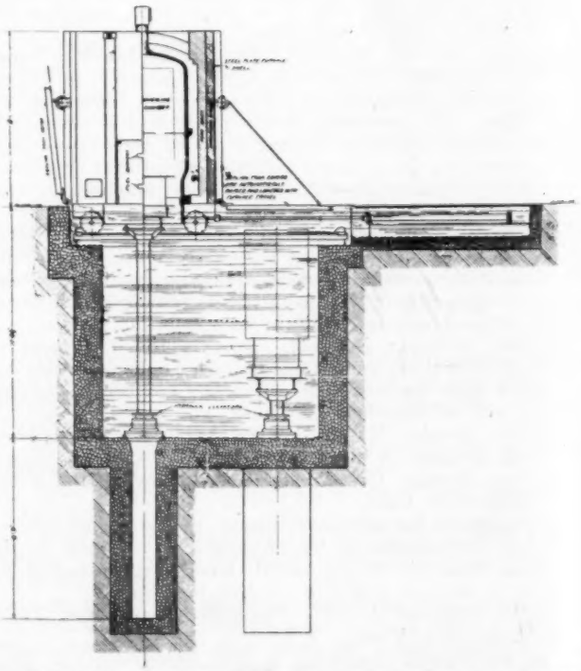
The operation of the furnace is as follows:

One of the elevators is raised, loaded with metal, and lowered back into the sealing tank, the heating unit is then moved over top of this loaded elevator, which, being again raised, carries the metal into the annealing chamber.

While this metal is annealing, the other elevator is raised through an opening in the tank cover, loaded with metal, and lowered back into the sealing tank.

After load No. 1 is annealed, it is lowered from the annealing chamber, into the sealing tank, and the heating unit is moved to a position over top of Elevator No. 2, now loaded and ready for annealing. Elevator No. 2, is raised into the annealing chamber and while it is annealing, Elevator No. 1 is raised through the opening in the tank cover, unloaded, reloaded, and again lowered into the sealing tank, to await its turn for annealing. This program is carried on throughout the day.

This furnace is designed for annealing large quantities of non-



VERTICAL SECTION THROUGH KENWORTHY ANNEALING FURNACE

forgings rods, wire and sheet metal in coils or stampings Coils or wire or sheet metal may be loaded loose, as received from the blocks or rolls, or they may be annealed on reels, as desired. When stampings are to be annealed, they are placed in perforated or wire-mesh containers, which are set on the elevator platforms of the furnace.

All metal annealed in Kenworthy non-oxidizing furnaces, is said to be uniformly soft and so clean as to require no pickling or cleansing. The furnace is run at full capacity by one man.

The fuel may be either oil, gas or electricity. Flexible pipes are provided to carry the fuel and atomizing elements to the furnace.

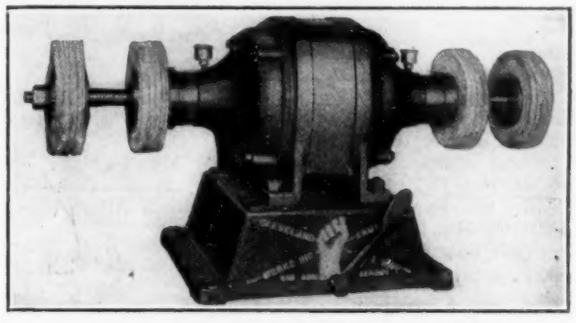
The pushers and elevators are operated by hydraulic power, from a small triplex pump, either belt or gear driven. This pump is equipped with pressure gauge and relief value, and operates at from 250 to 300 pounds pressure per square inch.

## NEW BUFFING MACHINE

The Cleveland Armature Works, Inc., Cleveland, O., for twenty-eight years manufacturers of special electrical machinery, announce that they have, after three years of development and trial, put on the market the first direct-driven, electric buffer equipped with Timken Tapered Roller Bearings. The outstanding characteristics of this is the combination of the antifriction characteristics of ball bearings with an adjustment for taking up the wear which is inevitable in any bearings, changing what was heretofore the weakest point in such buffers with plain or ball bearings, to the longest lived.

Other special features are self-ventilated motors with high overload capacity, shaft locks enabling one man to change wheels, wheel guards and rests adjustable with handle nuts, no wrenches being necessary, mounting arranged for floor pedestal, bench pedestal or post bracket, guards removable without removing wheels. The line covers one-half to fifteen horsepower in 1,800 and 3 600 r. p. m. and all phases and voltages. The throwout on the single phase is not on shaft as in other types, where it is a frequent source of trouble from grounding by metallic dust, but is a relay entirely enclosed in metal cabinet on the rear of the motor.

The floor pedestal is designed for the comfort of the operator, being straight in front and tapered to rear and also provided with



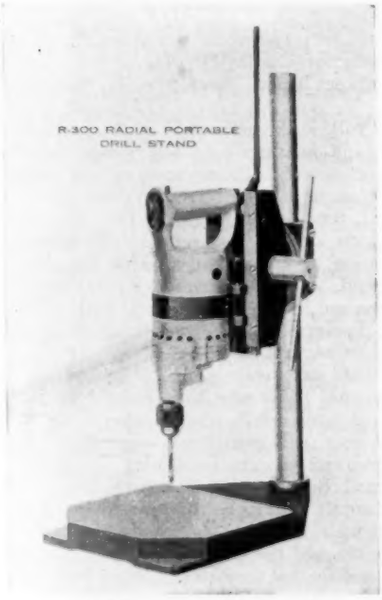
BUFFER WITH ROLLER BEARINGS

a foot bracing notch, so the fatigue in using this machine is said to be much less than previous types.

## THE HOLE SHOOTER

Starting with the idea that the Hole Shooter, an electric portable drill, could be adapted to many other uses in addition to the drilling of holes, The A. H. Petersen Manufacturing Company of Milwaukee announces that it has developed a number of unusual attachments which make this tool a whole machine shop of usefulness.

Among these inventions is a radial portable drill press stand, as illustrated here. Other inventions include end bristle wire brushes of various grades and sizes which are useful in removing rust and scale from metal, burnishing metal surfaces, removing paint and varnish, etc.; rotary taper files for reaming metal holes; special emery grinding wheels; special buffers, circle saws, etc.




THE HOLE SHOOTER

The drill press stand is designed to hold the Hole Shooter portable electric drill rigidly at any angle vertically or horizontally. When adjusted for use in a perpendicular position, the combination serves as a portable drill press. With the Hole Shooter adjusted in a horizontal position, the combination serves as an electric grinder, buffer or polisher.

The complete drill press stand weighs only 30 pounds. With the Hole Shooter included, the total weight is only 34 pounds. Thus the whole outfit is easily portable. Control of the drill press rack is obtained without resorting to expensive and cumbersome counterweights, chains or spiral springs which are embodied in many other small drill press stands. The fact that the cradle of this stand can be adjusted at any angle vertically or horizontally is also a very practical feature.

The end bristle wire brushes are particularly desirable in various classes of metal working. The stiffer brushes are practical for cleaning scale or rust from metal surfaces. Other brushes are suited to removing hard encrusted dirt, burnishing metal parts before refinishing, removing paint and varnish, cleaning rough castings, polishing and sanding wood and metal surfaces, etc.

## FINISHED BRASS CASTINGS

A special method of making brass castings is being introduced by Geo. P. Madison, 334 Eastern Parkway, Brooklyn, N. Y. The molds are made from a special asbestos fibre and other ingredients, with plaster of paris as a binder, and are handled somewhat like a French sand mold in that they are oven baked and clamped together in a similar way for pouring.

There are no flasks used. The body of the mold is strong and hard enough to stand up against all handling as well as the strain of the metal when pouring. They are made much faster than French sand molds for the reason that there is no ramming or facing, the material being fluid and poured over the patterns.

It is claimed that the cost of production with the proper pattern equipment, compares favorably with that of sand castings. The castings have a golden lustre on the surface and the minutest detail in the patterns are reproduced. Castings for ornamental purposes need no engraving or chasing as they come out of the molds almost ready for the plater. The cost of machining is considerably reduced, as in some cases little or no finishing is required and most measurements can be kept to within a few thousands of an inch.

The metal which lends itself best to casting by this process is a mixture similar to manganese bronze, but many other mixtures will make very nice castings, and it is stated, all of the bronzes can be cast by slightly varying the process of making the molds.

# ASSOCIATIONS and SOCIETIES

**REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS**

## INSTITUTE OF METALS DIVISION

**Headquarters, 29 W. 39th Street, New York**

The New York meeting of the Institute of Metals Division will be held on February 19-21, 1923, at 29 W. 39th street, New York. The program will be as follows:

MONDAY, FEBRUARY 19

4 p. m.—Auditorium. Chairman, President Arthur S. Dwight.
Solid Solutions. By Walter Rosenhain.

TUESDAY, FEBRUARY 20

2 p. m.—15th Floor. Chairman, Wm. B. Price. Business Session.

Nature of Solid Solutions. By Edgar C. Bain.

Cored Crystals and Metallic Compounds. By Edgar C. Bain.

Some Observations on Occurrence of Iron and Steel in Aluminum. By E. H. Dix, Jr.

Polishing Aluminum and Its Alloys for Metallographic Study. By E. H. Dix, Jr.

Density and Expansivity of Aluminum-silicon Alloys from 20° to 1,000° C. By J. D. Edwards.

Practical Spectrographic Analysis. By W. F. Meggers, C. C. Kiess, F. J. Stimson.

WEDNESDAY, FEBRUARY 21

2 p. m.—15th Floor. Chairman, George K. Elliott.

Occurrence, Chemistry and Uses of Selenium and Tellurium. By Victor Lenher.

Determination of Gases in Metals. By Harold L. Simons.

Study of Bearing Metals. By C. H. Bierbaum. Illustrated.

Tests on High-tin Bearing Metals. By P. W. Priestley.

Bright Annealing of Copper Wire. By P. E. Demmler.

Thermal Conductivity of Some Industrial Alloys. By H. M. Williams.

## AMERICAN FOUNDRYMEN'S ASSOCIATION

**Headquarters, 140 South Dearborn Street, Chicago, Ill.**

The Committee on Molding Sand Research, under the guidance of the Division of Engineering of National Research Council and American Foundrymen's Association, has made progress in its program of research. Many firms, universities, governmental departments and individuals are co-operating in the work.

The investigation was made possible through an appropriation to the American Foundrymen's Association, which was later supplemented by National Research Council.

$7,500,000 was expended by foundrymen in 1920 for new molding sands. Very little of it was reused. Much more might have been.

The Subcommittee on Geological Surveys has prepared for the use of the State Geological Surveys, standard methods of making surveys of molding sand resources and preparing test samples. Some satisfactory deposits, which have been worked for years, are deteriorating while others are being seriously depleted. Excessive freight charges being paid by foundrymen to get sand from long distances may possibly be avoided by making available deposits now undeveloped which are near at hand. The States of Illinois, Virginia, Maryland, Alabama, Florida, Pennsylvania, Tennessee and New Jersey, are already co-operating.

Standardization of tests for determining size, shape, cohesiveness, permeability, water content, thermal properties, analyses (including rational, chemical, mineralogical) are still under way and some of them completed.

Subcommittee on Conservation and Reclamation has mailed 7,500 questionnaires to non-ferrous and other foundries to obtain information on the proportions of sand reclaimed and methods of reclamation. The Ohio Brass Company is making investigations for the use of clay in retaining bond strength in molding sand heaps. Cost figures show that reclaimed sand costs about $1 per ton against new sand at the plant at $2.65 to $3.85 a ton. The process involves cleaning the sand grains of adhering fused material, then separating by air currents the good sand from the bad material.

## 1923 CONVENTION AND EXHIBIT

As mentioned in the January number of THE METAL INDUSTRY the 1923 convention and exhibit of the Association will be held in Cleveland, Ohio, April 28 to May 3, 1923. Secretary Hoyt reports that the Arena as the Exhibition Hall is known is a beautiful place, has good air and light, and he looks forward to satisfying all exhibitors. Further progress of the exhibition will be reported from month to month in our columns.

A meeting of the Nominating Committee of the American Foundrymen's Association was held Tuesday, January 23, at the Cleveland Athletic Club, Cleveland, Ohio, for the purpose of nominating a president, vice-president, and five directors, the latter for three-year terms each. This committee meeting was attended by the following: A. O. Backert, Chairman, Ralph D. West, N. K. B. Patch, C. S. Koch, J. Roy Tanner.

Nominations for the various offices were made unanimously as follows:

For president to serve for one year: G. H. Clamer, Ajax Metal Co., Philadelphia, Pa.

For vice-president to serve for one year: H. B. Swan, Cadillac Motor Car Co., Detroit, Mich.

For directors to serve three year terms each: L. L. Anthes, Anthes Foundry, Ltd., Toronto, Ont.; T. S. Hammond, Whiting Corporation, Harvey, Ill.; Alfred E. Howell, Somerville Stove Works, Somerville, N. J.; C. R. Messinger, Chain Belt Co., Milwaukee, Wis.; Thos. W. Pangborn, Pangborn Corporation, Hagerstown, Md.

## AMERICAN ELECTROPLATERS' SOCIETY

### NEW YORK BRANCH

**Headquarters, c/o J. E. Sterling, 468 Grand Ave., Long Island City, N. Y.**

The Fourteenth Annual Banquet of the New York Branch, American Electroplaters' Society, will occur this year on Saturday evening, February 17, 1923, and it is the intention to make it the most memorable banquet in the history of the New York Branch. Neither time or money will be spared to accomplish this result by the committee in charge.

The evening banquet will be preceded, in the afternoon, by an Educational Session in charge of Charles H. Proctor, the founder of the society and in whose honor, Founder's Day has been designated.

The educational session will, in the estimation of the committee, be the most entertaining and instructive of any similar session previously held by the branch society. Papers upon various plating subjects have been requested from influential members of every branch society throughout the United States. This afternoon session alone should prove an incentive to every one interested in the art and the dissemination of knowledge covering the electro deposition of metals to attend. All are welcome, whether members of the society or not. Come and be one of the several hundred that are expected to attend. Managers, superintendents, chemists and metallurgists are all welcome as well as platers.

The evening will be devoted excusively to one of pleasure. No speech making will take place. Those who have had the privilege of attending in former years, especially the Thirteenth Annual Banquet in February, last year, will gain some knowledge of the feast of good things and pleasure in store for them.

At the Fourteenth Annual Banquet and Founder's Day, New York Branch's Annual Banquet is largely participated in by the wives of the members and their friends. The evening is a ladies' as well as a gentlemen's night and the ladies attendance increases each year. Why? Come and see for yourselves. The ladies committee will serve tea to the visiting ladies in the club parlors.

Come one, come all and show by your attendance your appreciation of New York Branch's efforts to make the Fourteenth Annual Banquet the supreme of all previously held.

As the attendance is expected to be unusually large in numbers it is advisable to drop a post card to Mr. William Fischer, chair-

man of the Entertainment Committee, 300 St. Anns avenue, New York City, stating that you will attend. Do not delay. Now is the accepted time.

The afternoon session and banquet will be held, as in previous years, at the Aldine Club, 200 Fifth avenue, corner of 23rd street, New York City.

## PROVIDENCE-ATTLEBORO BRANCH

**Headquarters, Care of C. J. Poyton, 269 Ohio Avenue, Providence, R. I.**

### ANNUAL BANQUET

The sixth annual banquet of the Providence-Attleboro Branch of the American Electro-Platers' Society, held at the new Providence-Biltmore Hotel on Saturday evening, January 20, was the largest attended and most enthusiastic gathering in the history of the association. More than usual interest attended this banquet, for upon its success and spirit depended in a great measure the manner in which the preparations for the coming convention of the national association in Providence next July will be taken up. Judging from the spirit and expressions on this occasion, there will be no doubt as to the successful outcome of the convention plans.

An excellent beefsteak dinner was served, during which were selections by the Doric Male Quartet, and a short radio concert, the apparatus being loaned by the Martin & Copeland Company of Providence. It was operated by Carlton J. Poyton, who is in that firm's employ.

Levi J. Perkins, of R. E. Sturdy & Company, Attleboro, president of the Providence-Attleboro Branch, called the gathering to order and thanked the large number present for their attendance, which, he said, augured well for the success of the big convention to be held in Providence in July by the American Electro-Platers' Society. He extended a cordial welcome and then called upon Dr. Albert W. Claflin, honorary president of the Branch, to preside as toastmaster.

In assuming charge Dr. Claflin told several stories, read a number of pertinent newspaper clippings and referred to the coming convention in Providence. He said it was very gratifying to the officers and committee to see so many members present and the interest manifested he believed to be a forerunner of the interest that is to be shown in connection with the forthcoming convention to be held in the Biltmore Hotel on July 2, 3, 4 and 5. He then spoke briefly of the objects and purposes of the society, efficiency in everything pertaining to the electro-plating industry or profession.

Mayor Joseph H. Gainer, of Providence, extended a warm greeting to the organization and a cordial welcome to visiting officials and delegates from other associations. He congratulated the Providence-Attleboro Branch in having secured the national convention for this city, and also congratulated the national association on deciding to come to Providence. He spoke of the chaotic conditions that have pertained in many industries of this country where, because of the seemingly inexhaustible resources, there has been prodigality and waste. But the recent war taught the people the lesson of thrift and conservation, and now in every direction and in every industry conservatism is the watchword paramount.

"I am informed by your officers and leaders that the electro-plating industry has experienced a similar revolution from haphazard methods that have been replaced by those of more scientific character through competition from foreign countries, and I believe that the time is coming when American industries will have to equalize by scientific co-operation the lower standards of living and the cheaper wages in other countries. I congratulate you that as a society you have seen the handwriting and have made your industry more scientific and more businesslike."

In closing, Mayor Gainer paid a glowing tribute to C. H. Proctor, the father of the American Electro-Platers' Society, saying that he should be proud to look upon the results of his handiwork and to feel that he had blazed the trail for such a force, beneficial to the industry which it represents, to its individual members, to the employers for whom they work and for the entire community.

H. Nelson, chairman of the Special Convention Committee of the Providence Chember of Commerce, discussed the coming convention of the national association, and said that the Providence Chamber of Commerce stood back of the local branch in welcoming and entertaining the national body here in July. He described at considerable length what Providence and Rhode Island has to offer in the historical line as attractions for visitors from other sections of the country.

Dr. Richard M. Field, of Brown University, gave a most interesting and instructive informal talk on where the metals used in the industry are found, and illustrated it with numerous specimens of lead, zinc, tin, nickel, copper and other ores as they come from the mines.

The last speaker of the evening was Charles H. Proctor, Plating-Chemical editor of THE METAL INDUSTRY, who gave an address on the development of the electro-plater's art from the time that Zozimus, the Greek alchemist, first noted that copper could be reduced from its solution by the aid of iron to the present day. His subject was treated from the technical standpoint, dealing principally with the improvements in solutions and the better understanding of the use of the electrical current in precipitating the plate upon the base metal.

## BRITISH INSTITUTE OF METALS

**Headquarters, 136 Victoria St., S. W. 1, London, England.**

The annual general meeting of the institute will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.I., on Wednesday and Thursday, March 7th and 8th, commencing each day at 10.30 a. m. The meeting is expected to be of a specially interesting character as more papers are due for presentation than have ever before been offered at a meeting of the institute.

The Annual Dinner will be held at the Trocadero Restaurant in the evening of Wednesday, March 7th. Members may invite guests.

## QUAD CITY FOUNDRYMEN'S ASSOCIATION

**Headquarters c/o R. L. Van Alstyne, c/o Frank Foundry Corporation, Moline, Ill.**

The third meeting was held at the Davenport Chamber of Commerce at 6:45 p. m. Monday, November 20th. The attendance was very large, there being eighty present all interested and enthusiastic about the Association. A permanent organization was formed and the members passed a Constitution and By-laws as recommended by the Constitution and By-laws Committee.

Mr. Henry Bornstein, Chief Chemist of Deere & Company, gave a talk on "Chemistry and Cast Iron." He held the attention of all the members for an hour and a half. This was followed by a discussion for another thirty minutes and it was necessary to stop the discussion in order that the meeting could close at ten o'clock, which has been decided upon as the proper closing time.

The next meeting is to be held in Moline at the new LeClaire Hotel, December 18th. A. E. Hageboeck, is president; John Ploehn, vice-president, and R. L. Van Alstyne, secretary-treasurer.

The fourth meeting was held at the Moline Chamber of Commerce, December 18. Eighty-two sat down to dinner at 6:45 and the following committees were appointed:

Apprentice Committee: F. W. Kirby, chairman. Fellowship Committee: E. H. Heartlein, chairman. Membership Committee: P. T. Bancroft, East Moline, chairman.

The speaker of the evening was Mr. Frank D. Chase, president of Frank D. Chase, Incorporated, 645 North Michigan avenue, Chicago. The title of his talk was "A Modern Foundry." Mr. Chase illustrated his talk by many lantern slides he has accumulated from various parts of the country showing in detail construction now being used by the most progressive foundries. The speaker emphasized the danger of over-equipping a foundry. It has been his experience that many times the owner will have very ambitious plans which include building of buildings and equipment that are entirely unnecessary, and he has, in a number of cases, been able to increase the production with a very small investment in new equipment or buildings.

## EXPOSITION OF INVENTIONS

One of the features of the Universal Exposition of Inventions and Patents to be held in Grand Central Palace, New York City, February 17-22, 1923, will be to celebrate, each day of the exposition, one of the world's great inventors or scientists.

In view of the great interest shown by foreign governments in

the exposition, the first day, Saturday, February 17, will be International Day. Then, the following week will open with, Sunday as Marconi Day or Radio Day; Monday, Steinmetz Day, in honor of Dr. Chas. P. Steinmetz, the electrical wizard, of the General Electric Company; Tuesday, Edison Day, in honor of Thomas A. Edison, America's great inventor; Wednesday, Bell Day, in honor of the late Alexander Graham Bell, who made the modern telephone possible; and Thursday, Westinghouse Day, in honor of the late George Westinghouse, inventor of the air brake and many other inventions that have made railroad travel safe; and founder of the Westinghouse Electric & Mfg. Company, also the Westinghouse Air Brake Company, Pittsburgh.

The object of this exposition is to fulfill an important universal need, and it is intended to:

(a) Bring the capital of America and the inventive brain of the world together.

(b) Give all inventors full opportunity to show the public, the manufacturer, the merchant, the capitalist and financier, the possibilities for utility, business, trade and commerce that lie in their inventions.

Inventors whose devices may be adjudged to combine novelty and utility with commercial practicability, will be awarded, by qualified board, cash prizes, gold, silver and bronze medals and certificates of merit.

Information can be obtained from A. B. Cole, 110 W. 40th street, New York.

## ENGINEERING STANDARDS COMMITTEE

**Headquarters, 29 W. 39th Street, New York**

The frequency of two of the most serious and most common types of industrial accidents should be greatly reduced through the application of two safety codes which have just been approved by the American Engineering Standards Committee, 29 W. 39th street, New York. The Safety Code for Power Presses, Foot and Hand Presses, which has been approved as "Tentative American Standard," is the first national safety code on this subject to be prepared in America. The Safety Code for the Protection of Heads and Eyes of Industrial Workers, which has now received the A. E. S. C. approval as "American Standard" had been approved by the committee some time ago as "Recommended American Practice."

## REFRACTORIES ASSOCIATION

**Headquarters, Oliver Bldg., Pittsburgh, Pa.**

Research in refractories—particularly in connection with the manufacture of refractory brick—has been largely confined to laboratory work. A movement has been started, however, which has for its purpose the uncovering of a mass of information with regard to the furnace conditions which confront this material in actual service. It takes the form of an industrial survey, which will be conducted by the Refractories Manufacturers Association, Oliver Bldg., Pittsburgh, Pa., in co-operation with committees which have already been appointed in associations of users of refractory brick and with individuals, firms and corporations to whom refractory brick is an industrial necessity.

This survey will consume the better part of two years and it is hoped that preliminary reports will be made at the end of the first three months, the first half year and so on, until the survey is completed. These reports which will be compiled at the Mellon Institute of Industrial Research at Pittsburgh, Pa., will cover the information which will be gathered by using a rather elaborate questionnaire; this questionnaire will be distributed to consumers of refractory brick in the thirteen industries to which the bulk of this material goes. These include metal mixers, zinc, copper and lead refineries.

## AMERICAN WELDING SOCIETY

**Headquarters, 29 W. 39th Street, New York**

The American Welding Society was organized on March 28, 1919, its purpose being to extend the knowledge of the art of welding and its field of industrial application. But something more than this society was needed. To bring about the desired co-ordination of effort in learning basic facts about welding there was organized by the Society and the Division of Engineering of the National Research Council an Advisory Committee on Welding Research and Standardization known as the American Bureau of Welding. This Bureau consists of twelve representatives appointed by the American Welding Society, two each from each local section of that Society, and one each from some twenty other interested scientific, engineering and classification societies, and government bureaus. In addition, certain members at large are appointed because of special fitness. Eleven research committees were created, and as a first step critical summaries of existing knowledge on the most important phases of the work were prepared. It would be foolish to start with a research where we don't have available results of a large amount of work which has been done by individual investigators and by various companies. To learn just how much we know and then go after what we don't know, in a co-operative way that will avoid duplication of effort and bring the best minds to the immediate problems—such is the plan.

Already there have been prepared for publication—

(1) Specifications for standard tests for welds,
(2) Specifications for welding wire,
(3) Specifications for electric welding of storage tanks,
(4) Standards for arc welding apparatus.

A study of welding rail joints is in progress; also investigations in electric, gas, and thermit welding. In co-operation with the mechanical engineers, the refrigerating engineers, and others, research in welding unfired pressure vessels is being planned.

# Personals

**John Peckham** is now associated with Henry Prentiss and Company of New York. He will cover the entire territory of the company for the Sales Department.

**J. W. Anderson,** sales representative for the Manning Abrasive Company, Chicago, Ill., has been placed in charge of the Cincinnati Branch Office for that company.

Announcement is made of the appointment of **H. G. Smith** of the Bethlehem Shipbuilding Corporation, Ltd., as vice-president, in charge of sales with offices at 25 Broadway, New York City.

**G. Kelsh,** of the American Chasing & Modeling Company, 145 East 23rd street, New York, was for many years connected with this company before he went abroad. He has now returned and rejoined that company.

**Herbert M. Ramp** has been made superintendent of foundry for the Advance-Rumley Company at its plant in La Porte, Ind. During the past five years Mr. Ramp was superintendent of foundries for the American Locomotive Company, Dunkirk, N. Y.

**E. J. Kulas,** who was connected with the General Electric Company, Schenectady, N. Y., for 15 years, has been made president and general manager of the Parish & Bingham Company, Cleveland, Ohio, manufacturers of automobile frames and sheet metal stampings.

**M. W. Zeman,** general European director of the Osborn Manufacturing Company, Cleveland, Ohio, returned to the United States and expects to remain here until Spring. He states that the foundry equipment business in France and Belgium is somewhat better, but that American exports are handicapped by the weakness of the franc.

**Edwin S. Carman,** secretary and chief engineer Osborn Manufacturing Company, Cleveland, Ohio, delivered an illustrated lecture entitled "The Molding Machine, an Economic Necessity," on December 19, 1922, in Toledo, Ohio, to a large audience composed of foundrymen, pattern makers and technical students. The talk was given under the auspices of the Toledo Foundrymen's Association in the auditorium of the Scott High School.

**A. R. Todd,** for many years Senior Sales Representative

of the Hanson & Van Winkle Company in the Metropolitan District has recently been appointed by the Company as District Manager of the Metropolitan Branch, located at 70 Lafayette street, New York city. Mr. Todd is very well known in the trade and is thoroughly posted on all matters and conditions relating to the electroplating and polishing industry.

E. G. **Fahlman** is now with the National Smelting Company of Cleveland, Ohio, in the capacity of superintendent in charge of the aluminum smelting plant. He was formerly with the Aluminum Company of America, Niagara Falls, N. Y., as engineer in charge of dross recovery operations and more recently with the United States Bureau of Mines, Pittsburgh, Pa., studying cast and wrought brass and bronze with reference to removal of internal strains in same by heat treatment.

**Fred G. Cyrex,** for several years connected with A. P. Munning Company as Manager of their Cleveland territory has resigned. He will become Vice-President of John J. Vay, Jr., & Company, who handle a complete line of electroplaters' and polishers' equipment and supplies. In his new connection Mr. Cyrex becomes associated with Mr. J. J. Vay, Jr., until November 1st, Central Western Manager for The Hanson & Van Winkle Company. Mr. Cyrex before going with the A. P. Munning Company was connected with The Hanson & Van Winkle Company, in the Cincinnati territory.

# Deaths

## EDGAR B. PHILLIPS

Edgar B. Phillips died on December 19th at the age of 63, following an operation. He was general manager Phillips Wire Company, Freeman Street, Pawtucket, R. I.

## HARRY H. SUYDAM

Harry H. Suydam, for fifteen years President of the National Association of Ornamental Iron and Bronze Manufacturers, Cincinnati, Ohio, died recently at his home in Cincinnati. He was in his sixty-first year.

## OLIN M. CAWARD

On January 10th Olin M. Caward died after a brief illness. He was general manager Caward-Gaskill Furnace Corporation, Chicago, and was founder of that company, which manufactures oil-fired metallurgical furnaces. Mr. Caward was 46 years old.

## JACOB F. SNYDER

Jacob F. Snyder, 77, vice-president of the Hess-Snyder Company, Massillon, Ohio, died November 5th at his residence, 1707 East Main street. Mr. Snyder had been ill for several years. He was one of the pioneers in Massillon industry. Through his entire life he was actively engaged in the manufacturing business and fostered movements to bring here industries which have largely been responsible for Massillon's growth. Mr. Snyder entered the manufacturing business in 1872 when he became associated with the F. H. Snyder & Brothers in operating a general jobbing shop. Ten years later the firm of which he was a member consolidated with J. H. Hess and Brother, manufacturer of stoves. Mr. Snyder was chosen vice-president of the company shortly after its incorporation and retained the office until his death.

## EDWARD CROSBY DARLING

Following several years of ill health, Mr. Edward Crosby Darling, vice-president of the Aluminum Company of America, died in Philadelphia last August.

He was one of the prominent figures in the aluminum industry, both in America and in Europe.

Mr. Darling's business career began with the Aluminum Company of America in 1893, just after his graduation from Harvard. His first duties were those of a potman in the potroom at the New Kensington plant of that company. In 1896 he became superintendent of the New Kensington plant, which he managed with marked success for six years. In 1902 Mr. Darling was made general manager of the Aluminum Cooking Utensil Company, the subsidiary of the Aluminum Company of America which manufactures cooking utensils. In 1909 Mr. Darling was sent to London as the European representative of the Aluminum Company of America, with the title of Managing Director of Northern Aluminum Co., Ltd., which capacity he occupied until the year 1917, when conditions created by the war permitted him to return to America. He was at this time made vice-president of the Aluminum Company of America.

Mr. Darling's wide experience was unique. He has represented his company in almost every part of the globe where its activities have been set up and in his death one of the strong men has been lost, who have built up the great aluminum industry.

## FRED A. MARSH

The Link-Belt Company announces with great sorrow the sudden and untimely death of Mr. Fred A. Marsh, General Purchasing Agent of the company, at his home, 6436 Greenwood avenue, Chicago, on the evening of December 11, 1922, at the age of 52 years. Mr. Marsh was a member of the Link-Belt organization for over 33 years; was one of the organizers of the Purchasing Agents Association of Chicago, and served ably as its first president, and will be remembered by his large circle of business acquaintances as a particularly well informed man in his line, of sterling character, and an honor to the important business profession of Purchasing Agent.

## WILLIAM M. CRAMP

While advanced age had forced his retirement in recent years from active association with the industrial life of Philadelphia, Pa., William M. Cramp, who died on January 10, 1923, at the age of ninety-one, was long one of the foremost factors in the promotion of that vast industrial enterprise which has become as much identified with Kensington as the Krupp plant is associated with Essen. Born in Philadelphia in 1832, he was a son of the first William Cramp who had established the Kensington shipyard two years before, when he was only twenty-three years of age. Today, although under corporate management, that plant, which has grown vastly in acreage and activities, still retains, as one of its assets, the name of the William Cramp & Sons' Ship and Engine Building Company which was adopted as a result of the father taking the sons into partnership shortly before the Civil War. William M., who died the other day, and Charles H., who succeeded to the direction of the plant, on the death of the older William, in 1879, entered the firm in 1857 and three years later Samuel H., Jacob C. and Theodore Cramp, the other sons, joined. This family enterprise was then ready to begin its larger development. The outbreak of the Civil War brought more forcibly to the attention of the nation the fact that the Cramps' had created a national asset of greater value than had been realized. In the flow of contracts to the yard, during and after the war, when the iron navy supplanted the wooden one of the earlier period, Cramps' achieved fame as naval constructors and the yard grew rapidly in size as one of the major industrial works of the city.

An important part of this plant was its brass foundry where they made some of the largest metal castings.

# NEWS OF THE INDUSTRY

**BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS**

## WATERBURY, CONN.

FEBRUARY, 1, 1923.

Acquisition of the stock of the **Chile Copper Company** by the **Anaconda Copper Mining Company,** the owners of the **American Brass Company** will prove a boon to Waterbury, in the opinion of the latter company's officials. When the Anaconda Company was obliged to enter the open market to buy copper for the American Brass Company plants in this city there was always the possibility that the scarcity of the supply would make necessary a slowing up of operations here from time to time. With the great resources of the Chile company at its disposal, the Anaconda company expects to have available enough raw material to last 100 years and the cost of mining and transporting it to the local factories will be so low as to make the copper and brass industry more profitable than ever. It is well known that the main reason for acquiring the stock was to control a source of low priced copper for the local brass mills as the Anaconda's own copper is high cost.

Local brass factories as well as the city must shortly find other ways of disposing of waste products than emptying into the Naugatuck River. They must not pollute the water by using it for washing brass and other factory purposes, if the suggestions of the State Water Pollution Commission is adopted by this session of the legislature.

**John H. Goss** of the **Scovill Manufacturing Company** is one of the members of the commission which has recommended that a permanent state commission be appointed with drastic and far-reaching powers to prevent further pollution of the rivers of the state, and empowering it to take out injunctions against cities and factories which do not abide by its orders with regard to non-pollution of the streams.

**The Seth Thomas Clock Company** of Thomaston has been cited by the Federal Trade Commission to show cause why the commission should not issue an order requiring the company to desist from certain practices relative to the resale prices of its products, held by the commission to be in conflict with the commission's rulings as to unfair competition. The commission rules in all cases that a manufacturer shall not set a minimum resale price upon his products.

According to a statement of **R. E. Anderson,** vice-president of the **Winchester Repeating Arms Company,** made in this city last month, the merger of that concern with the Simmons Hardware Company will result in a great increase in activity during the coming year.

**Prof. Walter Rosenhain,** Director of metallurgical research at the National Physical Laboratory in England will address the members of the Production Club of Waterbury, March 1. He will make but six addresses in this country. He is considered one of the world's foremost metal experts, and all the manufacturers of the city will be invited to the dinner.

**George B. Scovill,** 16 Frederick street, for many years a manufacturer of this city, and a descendant of the founders of the Scovill Manufacturing Company, which was founded in 1807, next to the largest manufacturer of brass in the world, **dropped dead on West Main street, January 8.** He was 67 years old.

He was born in 1856 in Watertown. He was educated in the schools of Middlebury and Waterbury, having finished the Waterbury High School with the class of 1872. After completing his education he went into the foundry business with Cross Speirs and Company, later venturing into that business in his own behalf on Fairview street.

He retired from business about five years ago due to bad health, and has lived alternately in his home here and at Morningside-on-the-Sound since that time. He is survived by three daughters, Helen and Nadine of this city; and Mrs. William Reece of Kansas City; a son, Edward, of Waterbury; two sisters, Mrs. B. R. Kelsey, of this city, and Mrs. Benjamin Seeley, of Kansas City. Mrs. Scovill died a few months ago.

W. R. B.

## BRIDGEPORT, CONN.

FEBRUARY 1, 1923.

The report of the manufacturers' association on employment conditions shows steady and consistent increase up to the last week of January. Working on a basis of 25,318 employees and 49 hours a week as 100 per cent of normal, their report shows the number of employees now as 17,600 or 69.5 per cent of normal and the hours per week 49.8 or 101.6 per cent of normal, as compared to 12,021 employees or 47.5 per cent of normal and 39.8 hours per week or 81.2 per cent of normal in July, 1921.

Vacant floor space in Bridgeport is no longer a problem. The industrial division of the Chamber of Commerce organized to "sell" Bridgeport as an industrial location has filled the empty plants with new, busy hands and the hum of machinery.

The entire country was circularized and as a result the empty plants of last February have been filled.

Among the companies brought here during the year are: Westinghouse Electric & Manufacturing Company; Aluminum Stamping Company, pressed metal work; Lorraine Novelty Mfg. Company, most of whose metal products are absorbed by Woolworth's, Kresges and other popular-priced stores; Manufacturers Polishing and Platers' Supply Company; W. F. Concannor Shear Company; I. Benjamin & Brother; I. L. Marrow & Company.

**Jenkins Brothers,** valve manufacturers are to construct a new five-story cement addition to present plant, and will employ 600 more hands when completed.

**Remington Arms Company** has now the largest pocket cutlery plant in the country.

Beginning this month the Locomobile production program will reach an output of 30 to 35 auto trucks a day. The Locomobile car itself is following its traditional custom in output, producing only limited quantities. The concern is building two large additions to the plant.

A motor truck containing merchandise from the **International Silver Company,** valued at $20,000, was stolen January 20 on Lafayette street, New York. The truck was transporting the silverware to New York but had not been unloaded.

As a result of the order of Atty.-Gen. Daugherty, a careful audit of the books of the **Bridgeport Brass Company** is now in process. The order resulted from a conference in Washington, January 4, between Henry L. Stimson, counsel for the Bridgeport Brass Company, and Col. Henry W. Anderson, special assistant to the attorney general. The audit is for the purpose of settling the government's claim of $700,000 alleged to have been overpaid the company on war supply contracts. The company questions the figures presented by the War Department and alleges that it was not overpaid and did not defraud the government out of anything on the war contracts. Mr. Stimson on behalf of the company offered to place the books at the government's disposal to prove his claim. The Department of Justice will stand by the War Department's figures unless the audit shows them to be grossly in error and will insist on repayment of any due if there is such.—W. R. B.

## TORRINGTON, CONN.

FEBRUARY, 1, 1923.

The **American Brass Company** is the heaviest taxpayer in Torrington, according to the new tax list just completed. This concern is assessed for $3,645,255. The second highest is the **Standard** plant of the **Torrington Company,** $1,001,966. The total tax list for the town is $26,295,600.

**John R. Fall,** for 35 years engaged in the wire department of the Torrington plant of the American Brass Company, died January 1, at a sanitarium in Hartford at the age of 76. He left one daughter, Mrs. G. Morton Reynolds.

**Augustine A. Poley,** 66, a caster at the Torrington plant of the American Brass Company, died suddenly on January 13.

A part of the office force of the **National Sweeper** division of the **Torrington Company** is to be moved to New York City.

**A. C. Raspiller,** director representing the American Brass

employees' group, has been elected president of the Community Co-operative Company. H. M. Cameron is vice-president; John W. Whalen, secretary, and H. J. Healey, treasurer.

William **J. Martin,** 48, a foreman at the plant of the **Progressive Manufacturing Company,** died January 14.

The annual meeting of the **Maria Seymour Brooker Memorial,** the relief and welfare institution established by **Charles F. Brooker** as a memorial to his mother, was held during the latter part of January. Officers were re-elected as follows: President, Frank M. Travis; Vice-president, Mrs. Robert C. Swayze; Treasurer, John M. Wadhams; Recording Secretary, Mrs. John B. Lyon; Corresponding Secretary, Mrs. T. L. Thomson; Counsel, Willard A. Roraback; Members of Board of Managers, Mrs. Frank R. Appelt, Frank J. Damon and Frank M. Travis.

## NEW BRITAIN, CONN.

FEBRUARY, 1, 1923.

The New Year has started off with a vigor that augurs well for the coming months. Every local factory seems today to be virtually on a pre-war basis as regards employment and production and some of the concerns are having to work overtime shifts in all or part in order to keep abreast of business. All branches of the **American Hardware Corporation** are working at capacity, filling large orders from all parts of the country for builders' hardware of all description. The **P and F Corbin** and the **Corbin Cabinet Lock** divisions are operating overtime in many departments. Absolutely unofficial rumors hint that it is not beyond the realm of possibility that eventually the **Stanley Works** may acquire the **New Britain Machine Company** plant which has been in a bad way since the war.

**Landers, Frary & Clark,** with their large and diversified line of products, is hustling as usual. The electrical equipment branch is putting out a large production and the cutlery departments also are working at capacity. **The North & Judd Manufacturing Company,** under the new leadership of **Frederick Holmes,** seems to be keeping up with the times and the **Traut and Hine Manufacturing Company** likewise has ample orders for small metal novelties which are made there.

In anticipating of a building boom in the Spring, all local manufacturers are at present working at top speed with a capacity output and indications are that the coming Spring will see no let down in local industries. H. R. J.

## ROCHESTER, N. Y.

FEBRUARY, 1, 1923.

With the month of January nearly finished it is safe to state that business conditions for the first three weeks of the new year have shown a considerable improvement over the same period a year ago. An unusually severe winter has not operated to retard activity even though climatic conditions always interrupt the plans of the metal industry to a certain extent.

So far as Rochester is concerned mid-winter dullness has affected but few of the larger manufacturing plants using non-ferrous metals. More persons are employed at the **Eastman Kodak** plants, the **Bausch & Lomb** optical works, the **Pfaulder** works, and the **General Railway Signal** works than at any time in more than a year past. Large orders for automatic railway block signaling equipment have been received from the Great Northern and the Northern Pacific Railroads, as well as from the Imperial Government Railway of Japan and the Southern Australian Railway. Orders for electric interlocking apparatus have been received from the Philadelphia & Reading Railroad, the New York Municipal Railways, and the Ann Arbor Railroad. The construction of this railroad equipment requires a great volume of steel, copper, brass, aluminum, lead, bronze, besides a certain quantity of silver. The plating rooms of the signal plant will be operated at top speed.

Inquiry among brass foundrymen reveals the fact that the industry is in a much more healthy state than a year ago, and orders for castings are more numerous and more profitable. More brass moulders are employed at this time than in 1922, and somewhat better prices are obtained for finished products.

The brass and nickel-plating industry is in a much stronger position, so far as business is concerned, than a year ago and the demand for finished materials is firmer. This condition is true, not only among the independent plating works, but also of the plants in connection with the larger manufacturing establishments throughout the city. G. B. E.

## DETROIT, MICH.

FEBRUARY, 1, 1923.

Following the line of all other business here the brass, copper and aluminum trade is experiencing one of the most prosperous times in its history. It even extends to the manufacturers of plumbing supplies, who had reported a very poor condition for many months. This is accounted for by the great building expansion all over the country. The manufacture of heating supplies such as valves, etc., also is reported good. This also is accounted for by the general revival of business everywhere.

Added to this is the great demand for automobiles which is making a heavy pull on the smaller copper and brass manufacturing concerns, many of which, while engaged in the manufacture of valves, trolley wheels, etc., also fill in on automobile supplies. The Detroit Terminal Railroad, a concern that operates a belt line about the city and draws much business from the automobile and brass manufacturing plants is simply at its wits' end in an effort to clear terminals entering these plants.

Trolley wheels of copper instead of bronze, from which they have been made for many years, may yet come into vogue as the result of an investigation carried on by the department of engineering research at the University of Michigan, at Ann Arbor. The experiments have been under the direction of Prof. A. E. White and shows that copper is by far a better metal for use in trolley wheels. There arose in the beginning a question of hardness of the metal and so tests were carried out to determine to what extent surface hardness could be attained and also to what extent the body of the wheel under the surface could be hardened. It was found that trolley wheels could be made with a surface three times the hardness of the bronze wheels and it also was discovered that the bodies of such wheels were twice as hard as were the bodies of the bronze wheels. The combination of all these considerations, it is believed, will result in sweeping changes in the manufacture of trolley wheels now in vogue.

At the annual meeting of stockholders of the **Detroit Copper and Brass Rolling Mills** the following directors were chosen: A. H. Buhl, L. D. Buhl, F. J. Hecker, Alex Henderson, F. H. Hoffman, L. A. Jones, R. P. Joy, A. J. Peoples and H. D. Sheldon. The following officers also were elected: L. H. Jones, president and general manager; R. P. Joy, vice-president; A. H. Buhl, second vice-president; F. H. Hoffman, assistant general manager; A. J. Peoples, secretary and treasurer; W. P. Bache, assistant secretary and treasurer; Alex Henderson, works manager; J. E. Workman, auditor. F. J. H.

## PROVIDENCE, R. I.

FEBRUARY, 1, 1923.

There was a larger number of failures in the jewelry industry throughout the country during the past year than during 1921, although the amount involved was smaller, according to the annual report of **Henry Wolcott** as **President** of the **Manufacturing Jewelers' Board of Trade,** at the 39th annual corporation meeting held at Providence, on Friday afternoon, January 26. "But the belief is abroad in the land," the report continues, "that the year 1923 will prove one of increased activity and business gain."

The directors elected were William P. Chapin of Chapin & Hollister Company; George H. Holmes, of George H. Holmes Company; Howard C. Baker, of the Baker-Manchester Manufacturing Company; Morgan W. Rogers, of Parks Bros. & Rogers, Inc.; Samuel B. Levy, of the V. E. Black Company, Inc., and James O. Otis, of Harvey & Otis, all of Providence, and Lawrence E. Baer, of Baer & Wilde Company, Attleboro, Mass., and Thomas Allsopp, of Allsopp & Allsopp, Newark, N. J.

**Horace M. Peck**, secretary of the association in his annual report said in part: "The past year stands out pre-eminently as one in which our association has given the greatest service to the largest membership of its 39 years of existence, and our finances are in excellent condition. The total membership at the present time is 433.

At the meeting of the directors which followed the corporation meeting Henry Wolcott of the Wolcott Manufacturing Company, Providence, was re-elected president. The other officers elected were: First Vice-President, Everett L. Spencer, of the E. L. Spencer Co., Providence; Second Vice-President, Joseph Finberg, of the Finberg Manufacturing Company, Attleboro; Secretary and Manager, Horace M. Peck, of Providence.

A steadily increasing business has obliged the **Brass Products Foundry** to remove to larger quarters from those formerly occupied at 341 Eddy street. The new plant is located on Massasoit avenue, Pawtucket, where its building covers an area of 200 by 60 feet, with a frontage on a wharf enabling quick and convenient handling of sand and other materials used in its operations.

The manufacture of brass by the electric furnace method was the subject of a lecture delivered before the members of the Providence Engineering Society the other evening by **W. R. Webster**, vice-president of the Bridgeport Brass Company. He showed the complete process in miniature by the use of a model furnace.

**H. J. Astle & Company, Inc.**, of this city, report an exceptionally good business during the last few weeks, especially in connection with the installation of various Boland systems in jewelry factories throughout the country. W. H. M.

## TRENTON, N. J.

FEBRUARY, 1, 1923.

Business conditions remain good among the metal industries of Trenton and the coming season is also expected to be a good one. Although the prices of materials have advanced there appears to be a good demand for products. At the present time there is a scarcity in builder's hardware. **William G. Wherry**, president of the **Skillman Hardware Manufacturing Company**, said to a representative of THE METAL INDUSTRY: "The indications are that we are going to have a busy year and we are already receiving big orders for builder's hardware for Spring building. The prospects are good all over the United States and Trenton is bound to receive its share. There is plenty of building scheduled for Trenton in the early spring and summer." Other manufacturers hold the same view and expect to be kept busy for some time to come.

**Samuel Hirsch Metal Company, Inc.**, of Newark, N. J., has been incorporated at Trenton $100,000 capital to manufacture metal products. The incorporation papers were filed by Frances P. Weyman, of Newark.

**United Electric Stores Company**, of New Market, N. J., has been incorporated at Trenton with $100,000 capital by Irvin A. Edelman, of Jersey City, to deal in electrical appliances.

**Kearny Hardware Company**, of Kearny, N. J., has been incorporated at Trenton with 1,000 shares no par value to make and deal in hardware. Charles M. Myers, of Newark, is interested in the new concern.

**Moore & Hoffman, Inc.**, jewelers, of Newark, have been incorporated at Trenton with 1,500 shares no par value by Brissen & Schrenk, of New York.

**Thresher Radio and Machine Corporation**, of Newark, has been incorporated with 100,000 preferred and 2,000 shares no par value to manufacture radio products. The incorporation papers were filed by Carlyle Garrison of Jersey City.

**Feldman Ring Manufacturing Company**, of Newark, has been incorporated at Trenton by Precker & Precker, of Newark, with $100,000 capital to manufacture jewelry.

**Fleck-Atlantic Company**, of Atlantic City, N. J., has been incorporated at Trenton with $200,000 capital to manufacture plumbing and electrical supplies. The incorporators are George C. J. Fleck and John G. Fleck, of Philadelphia, and F. S. Moyer, of Atlantic City.

**LeCompte Manufacturing Company**, of Newark, N. J., has been incorporated at Trenton with $250,000 capital to manufacture hardware. The incorporators are Walter L. Price, Irving Riker, Newark; Henry Y. Hooper, Jr., Montclair; William B. Harding and Thomas E. Fitzsimmons, of South Orange, N. J.

**The Raritan Aniline Works**, of Piscataway, N. J., has been sold by Receiver William B. Matlack, of Trenton, N. J., to **B. Lissberger & Company**, of New York, for $60,000. The plant was declared to be insolvent some time ago by the Lissberger company, which had a large interest in the old company. The plant will be reopened soon. C. A. L.

## INDIANAPOLIS, IND.

FEBRUARY, 1, 1923.

**The Elwood Brass & Aluminum Manufacturing Company**, at Elwood, Ind., has changed its name to the **Elwood Castings Company** and increased its capital stock from $20,000 to $25,000.

**The Studebaker Corporation** at South Bend, Ind., is asking for bids for the construction of a foundry building, an addition to its plant. The company will be equipped to do virtually all its own work in this line.

**J. W. Johnson**, of Kokomo, Ind., stated recenty that stockholders of the three affiliated companies, the **Kokomo Brass Works, Byrne-Kingston Company**, and the **Hoosier Iron Company**, had re-elected all the old officers and directors. A very satisfactory year was reported by the heads of the three institutions and the outlook for this year is said to be very bright.

**The Standard Metal Company**, of Indianapolis, recently gave a dinner to its traveling salesmen, office help and departmental heads. Bonuses were awarded to many of the salesmen. J. F. Jewar, of Indianapolis, vice-president of the company, who has retired from active service as a traveling salesman and who will remain at the company's office, was presented with a traveling bag. The company recently acquired a large new warehouse with adequate track facilities on West Merrill street. Reports of increased business were made by representatives at the dinner.

The trade is considerably interested in a bill to be presented at the next session of the Indiana general assembly, which, in the belief of its framers, would prohibit strikes in all forms in Indiana. The bill is the first of its kind that ever has been presented to an Indiana legislature and even those most enthusiastic in its favor admit that such a measure will have a difficult time getting enacted into law. It will be fought vigorously by organized labor. The exact identity of the forces behind the measure is being kept a close secret. It is to be known as a "right to work" bill, but its general effect, those behind the movement assert, will be to forestall the organization or calling of industrial walkouts.

The measure would make it unlawful "for any person or persons acting jointly or singly with another or others, by means of any kind of force, threats, coercion, intimidation or violence, to cause or induce or attempt to cause or induce any person engaged in a lawful occupation to quit such employment, or to refuse or decline to accept or begin a lawful employment," and provides punishment for violation. The significant part of the penalty clause is that confinement is mandatory with the court in case of conviction.

## MONTREAL, CANADA

FEBRUARY, 1, 1923.

Business in the metal industry is progressing steadily and the outlook for 1923 is for continued prosperity. Manufacturers are increasing their sales forces and orders are coming in satisfactorily from jobbers and dealers whose stocks are low. Of great significance to the brass industry are the announcements of the past two weeks with reference to the placing of millions of dollars worth of orders for track and rolling stock equipment for the **Canadian National Railway**.

It is learned at the offices of the **Canadian National Railways** that of the tenders that were recently called, 1,200 cars were placed with the **Canadian Car and Foundry Company** at Montreal, including 100 passenger cars. The other orders for freight and passenger cars were distributed to other con-

certs. The **Canadian Locomotive Company,** of Kingston, received an order for 26 locomotives, while the **Montreal Locomotive Works** received an order for 35.

Building indications look very bright at this time, which means an increased demand for plumbing and steam supplies and other brass goods used in construction work. The outlook for business has not been so bright for the past three years.

P. W. B.

## BIRMINGHAM, ENGLAND

JANUARY 19, 1923.

Apart from the slackening which usually follows after Christmas, business in most of the non-ferrous metal trades may still be regarded as improving. Builders' brass foundry is expected to be in better request this year than last. More dwelling houses of the better class are being put in hand, and enterprise in building for municipal and other public purposes is now being more generally resumed. Building is also more active in the British overseas dominions. Cabinet brass founders are much better employed, both for home and export. The percentage of unemployment in the brass trade generally is now little higher than in pre-war days, and there is actually a shortage of skilled men, many brass workers having during the last few years been drawn into other trades. Among these is the motor car trade, which now is experiencing a revival. This has brought additional business to the aluminium foundries and to the manufacturers of metal fittings, but the lamp trade has not yet benefited to any great extent. Railway extensions now in progress and schemes likely to result from the regrouping of companies which have taken place recently, may be expected to bring a variety of work to the metal trades, as will also the revival of shipbuilding. Makers of aluminium hollow-ware are doing better, both at home and abroad, though in some overseas markets German competition has not yet been overcome. In the home market manufacturers have benefited by the check on German imports caused by the imposition under the Safeguarding of Industries Act of a 33⅓ per cent duty. Some success has attended the application of aluminium to the manufacture of dairy utensils and of the vessels used for the transport of milk. In the tube and rolling mills, business is fluctuating, but upon the whole progressive. The brass and copper tube associations, while retaining their basis prices, have made some concessions in the charges for extras. Prices of all metals show a tendency to greater firmness. Sellers of scrap are holding out for better prices, while the scarcity of cartridge material is sending more users into the market for virgin metal. In the electrical trades, orders for generating plant are a little more abundant. A number of new railway electrifications are expected. Electrical accessories are in growing request, both at home and for export. The popularity of broadcasting has brought about a great demand for receiving instruments and manufacturers are sending out urgent inquiries for materials. A little improvement has taken place in the Birmingham jewelry trade, but business is still at a very low level. Electro-plate orders fell off considerably just before Christmas and the revival is proceeding rather slowly. In most of the hardware trades export business has received some check from the political uncertainty caused by the prolongation of the negotiations with Turkey and the French advance into the Ruhr valley. Nevertheless, the prospect, judging by the inquiries now being received, is considered to be encouraging.—G.

# Business Items—Verified

**Metals Disintegrating Company** has moved its office from 15 Broad street, New York, to the plant in New Jersey.

**The American Ring Company,** of Waterbury, Conn., states that the rumor that it is to increase its brass facilities is an error.

**Marion Brass & Bronze Foundry,** Marion, Ohio, has just completed an addition to the foundry, giving 4,000 square feet additional floor space at a cost of $6,000.

**St. Louis Machine Tool Company,** St. Louis, Mo., has issued a letter on its roller bearing loose pulley, which is said to be a great success. There are also issued testimonials on this pulley.

**The Stout Sign Company,** North Twelfth street, St. Louis, Mo., manufacturer of embossed metal signs, has awarded contract to W. C. Harting, St. Louis, for a new plant at 2523 Sullivan avenue.

**The Aluminum Foundry Company,** Boston Mass., recently was incorporated with $10,000 capital stock by Harry D. Finberg, and others. The firm operates the following departments: brass, bronze and aluminum foundry, casting shop.

**The Flexlume Corporation,** 74 Kail street, Buffalo, N. Y., manufacturer of metal electric signs, is planning the erection of a new factory at Military Road and Skillen street, estimated to cost $100,000. This firm operates the following departments: plating, sheet metal work.

**Merchant & Evans Company,** Philadelphia, Pa., in a recent circular letter to the trade suggests the immediate placing of orders for type metals for early delivery, in order to be prepared for requests for printed matter. This firm operates the following departments: smelting and refining.

**E. N. Riddle Company,** Broadway and Ottawa street, (manufacturer of lighting fixtures, etc.) is in the market for foundry equipment. This firm operates the following departments: bronze and aluminum foundry, brass machine shop, grinding room, spinning, brazing, plating, soldering, polishing and lacquering.

The **Menzmayer Sheet Metal Works,** Junction City, Kan., will commence the construction of a two-story and basement building estimated to cost $10,000. H. Menzmayer heads the company. This firm operates the following departments: spinning, plating, japanning, air brush painting, stamping, soldering and lacquering.

The **Doehler Die-Casting Company,** Court, 9th & Huntington streets, Brooklyn, N. Y., elected the following directors on January 6th, 1923, to serve for the ensuing year, namely, H. H. Doehler, Charles Pack, John A. Schultz, Jr., H. B. Griffin, John Kralund, F. L. Duerk, John L. Pratt, A. P. Sloan, Jr., and E. J. Quintal.

**The Cox Brass & Manufacturing Company,** 5601 Carnegie avenue, Cleveland, Ohio, awarded the contract for the construction of a 1-story, 60 x 200 ft. warehouse and machine shop on East 55th street and Luther avenue. Estimated cost $50,000. This firm operates the following departments: plating, japanning and polishing.

**The Oxweld Acetylene Company,** announces that its Western Department, formerly located at 1077 Mission street, San Francisco, has recently moved to larger quarters in the same block. The new address is 1050 Mission street. At the new location the company occupies the entire building, two stories and basement, 20 x 150 ft.

**Apex Smelting Company,** 180 N. Market street, Chicago, Ill., has leased a foundry site at 2554 W. Fillmore street, consisting of 10,000 square feet of foundry space. The company will do smelting and refining, principally of aluminum and white metal alloys, and in addition to manufacturing, will job and handle almost any grade of non-ferrous metals.

The Jersey City Welding Shop of the **Metal & Thermit Corporation** in addition to its present excellent facilities for undertaking Thermit welding repairs has also been recently equipped for making welds on lighter sections by means of the oxy-acetylene and electric processes. This service will be of particular value in cases where large production work is desired.

**The H. A. Wilson Company,** 97 Chestnut street, Newark, N. J., manufacturer of metals, heating-control devices, etc., has leased space in the building at 1-7 Oliver street for new works and will remove its heating control device department to the new location. H. A. Wilson is president. The firm operates the following departments: smelting, refining and rolling mill.

**The Lacey Manufacturing Company,** Fairfield avenue and Middle street, Bridgeport, Conn., manufacturers of tools, dies, etc., is building a brick and steel building of first class up-to-date construction at 715 Union avenue, 50 x 100 ft., and will be able to double its present force. They make a specialty of metal stampings. This firm operates the following departments: tool room and grinding room.

The plant of the **Yoder Company,** Cleveland, Ohio, manu-

facturer of sheet metal work and machinery, was partially destroyed by fire. The building containing the manufacturing departments equipped with about 40 machine tools was burned and it is expected that only from 25 to 40 per cent of these can be salvaged. The company is rebuilding this portion of its plant and expects to be operating again shortly.

**The Brass Products Foundry** has moved to larger quarters from that formerly occupied at 341 Eddy street, Providence, R. I. The plant is now located at Massasoit avenue, Pawtuxet, and the building covers an area of 150 by about 50 feet, with a frontage on a wharf enabling quick handling of sand and materials used in molding. This firm operates the following departments: brass, bronze and aluminum foundry, grinding room.

A consolidation of the **Improved Appliance Company** and the **Combustion Utilities Corporation** has been consummated and operation will continue from January 1, 1923, under the name of Combustion Utilities Corporation. The Improved Appliance Company will be known as the Brooklyn Branch and will continue to manufacture and sell "Improved" appliances as heretofore. The personnel of the Brooklyn Branch will be practically the same as in the past.

In addition, the Toledo Branch of the Combustion Utilities Corporation, after about February 1, 1923, will carry stock at its address 327 South Erie street, of "Improved" appliances and western shipments will be made from Toledo, thus facilitating delivery in the West.

**The Mine and Smelter Supply Company,** with branches in Denver, Salt Lake City and El Paso, has taken over the distribution of Wilson Plastic-Arc Welders and Wilson Color-Tipt Welding Metals of the **Wilson Welder & Metals Company,** 132 King street, New York City. The Mine and Smelter Supply Company will carry in stock at each of its branches a supply of all grades of Wilson color-tipt metals and plastic-arc machines for distribution throughout their territory.

**The Northern Engineering Works,** Detroit, Mich., electric crane and hoist builders announce change in address of their local Sales Offices as follows: New York City, 30 Church street, room 623; in charge of H. C. Rood. Philadelphia, 51 Estey Building; in charge of John H. Bricker. Chicago, 53 West Jackson Boulevard, room 630 Monadnock Building; in charge of M. H. Haeger of the Abell-Howe Company. St. Louis, 606 Pontiac Building; in charge of J. S. Davidson.

An alliance between **Bausch & Lomb Optical Company,** Rochester, N. Y., and **Stevens & Company, Inc.,** Providence, R. I., has been formed for the purpose of developing the products of both organizations, toward a complete line of optical merchandise. Both companies will continue to function as separate organizations, with their respective business policies unchanged. Correspondence, etc., will be directed as heretofore; but for greater convenience the branch offices at Chicago and San Francisco have been combined.

When the city of Columbus, Ohio, took over the **Melvin Brothers** plant property for park purposes, the machinery and equipment was sold and the partnership dissolved. **O. L. Melvin** announces the opening of the new shop operating under his name at 184 West Spring street, Columbus, Ohio. The shop is equipped to specialize on bronze tablets, cast signs and small wood and metal patterns. He would like catalogues on spraying machines or air brushes. This firm operates the following departments: plating, patternshop, soldering, polishing and lacquering.

**The Standard Conveyor Company,** North St. Paul, Minn., is pleased to announce that it has acquired by purchase all the rights, titles and patents pertaining to the well-known "Brown Portable" line of portable and sectional piling, elevating, conveying, loading and unloading machinery for the handling of packed and loose materials. This line of machinery has been manufactured by the Brown Portable Conveying Machinery Company at North Chicago for ten years. Until further notice the plant will be continued in operation by the Standard Conveyor Company.

**The Electric Furnace Company,** Salem, Ohio, has made several installations of interest, among which are the following: two furnaces adapted for heating lead baths through which razor blade steel is drawn for treatment. The first bath will be maintained at 1500° F. and the second bath at about 600° F. These furnaces are of the automatic control type and are provided with metallic resistors—Auto Strop Safety Razor Company of New York City. A furnace for melting brass—Buick Motor Company of Flint, Mich. A 105 K. W. brass melting furnace—Ohio Injector Company of Wadsworth, Ohio. A 75 K. W. furnace for melting brass—Hammond Brass Works, Hammond, Ind. A 75 K. W. brass melting furnace for the American Stove Company of Bedford, Ohio, and another furnace with special automatic control has just been shipped to the Cleveland plant of the latter company for the calorizing of stove chimneys.

## INCORPORATIONS

**Nolte Brass Company,** Springfield, Ohio, which was established in 1886 and which has been owned and operated as an individual, is now incorporated with a capital of $125,000 by A. B. Nolte and W. H. Pence.

**The Wheeling Bronze Casting Company, Inc.,** Wheeling, W. Va., capitalized at $100,000, has incorporated in the state of West Virginia and is installing a 13-in. rod mill, which will have a capacity of about 25 tons of rounds, flats and squares per day. It is its intention to roll a new kind of anti-acid metal, which will be used by various pickling tank builders. It will also cold draw this same B. & M. metal for use as pump rods, valve stems, etc. The metal will be purchased in ingot form from the Wheeling Bronze Casting Company which is now owned and controlled by W. J. Braddock and J. W. Millard. There are sales offices at the present time in New York, Philadelphia and Pittsburg, and the main office at Wheeling.

## HANSON & VAN WINKLE COMPANY

The Hanson & Van Winkle Company held its regular Annual Sales Convention at the home office, 269 Oliver street, Newark, N. J., on January 11 and 12. It was a huge success, there being some 50 representatives present from different territories all over the United States and Canada.

On the first day, after the reception of the different district managers with their field forces, a luncheon was served in the company's dining room. The president, Van Winkle Todd, delivered an address of welcome, and presented to R. G. Bruce, general sales manager, the master-key to all of the manufacturing departments of the works.

HANSON & VAN WINKLE COMPANY SALES FORCE

Friday, January 12, was devoted to special features and illustrated talks were given by the company's experts. Guerin Todd, M.E., head of the electrical department; W. R. King, the company's plating expert; F. J. Liscomb, from the Chicago District.

These were followed by luncheon, after which short addresses of considerable interest were made. As a grand finale,

the company entertained at a banquet held in the new Newark Athletic Club in the evening.

Altogether the convention was a great success, and the keynote everywhere was extreme optimism.

The Hanson & Van Winkle Company has compiled its No. 23 Catalogue, which is now in the hands of the printers, and will be ready for distribution on February 15. This new edition not only describes the company's latest mechanical plating apparatus, but also contains a great deal of other valuable information.

The **Hanson & Van Winkle Company** recently purchased the business and stock of **Roderick A. McIntire Company,** 137 Chestnut street, Providence, R. I., thus establishing a Providence Branch where a general stock of electroplating and polishing equipment and supplies will be kept for prompt delivery. The business will be continued under the direction of R. A. McIntire.

A Cotrell electrostatic precipitator is in use at the plant of the Eastman **Kodak Works** in Rochester, N. Y. In connection with the waste paper burner it not only prevents the distribution of dust over the neighborhood but also recovers a considerable amount of silver.

**Vianney Wire Die Works,** 1 Union Square, New York, have moved into their new quarters on the seventh floor of the Stuyvesant Building, 100 Fifth Avenue.

**John J. Vay, Jr., & Company,** Cleveland, Ohio, will represent the following manufacturers in the middle-west: Milton Manufacturing Company, Syracuse, N. Y.—polishing wheels and buffs; Harshaw, Fuller & Goodwin, Cleveland, Ohio—compositions, chemicals; Eager Electric Company, Watertown, N. Y.—plating dynamos, motor-generator sets, motor driven ball bearing buffing and polishing lathes; Bacon Felt Company, Winchester, Mass.—felt polishing wheels and sheet felt.

**New York Testing Laboratories,** 80 Washington street, New York, have just installed a new automatic 100,000 lbs. Tinius Olsen testing machine, making theirs one of the up-to-date plants in New York City for handling of tensile tests, compression tests, transverse tests, etc.

Several hundred miles of aluminum cable was purchaed from the **Aluminum Company of America,** Pittsburgh, Pa., by a Pacific coast utility company, at prices which were considerably less than those quoted by manufacturers of copper wire.

**E. P. Reichhelm & Company, Inc.,** have temporarily moved their office from 26 John street, to the office of the American Swiss File & Tool Company, at Elizabethport, New Jersey, but expect within a short time to have offices at the same address. The office of the **American Swiss File & Tool Company** was moved to the factory at Elizabeth, New Jersey, on January 2, 1923, and all communications to that company should be addressed there.

## POWER SHOW

In an exhibit of equipment and supplies for power plants, held recently in New York, the following concerns showed materials of interest to non-ferrous metal manufacturers and users.

**Hytempite.**—A high temperature fire brick cement made by Quigley Furnace Specialties Company, New York.

**Leddellite.**—A new anti-friction metal with a lead base made by Leddell Metals Company, Long Island City, N. Y.

**Pittsburgh Testing Laboratory.**—Inspecting engineers and chemists. They do analytical work, testing, metallographic work, fusion tests and sampling.

**Scovill Manufacturing Company,** Waterbury, Conn.—A wide variety of products very similar to their exhibit at the exposition of the Marine Association. It covered tubes, bars, rods, sheets, wire and miscellaneous.

## GRAPHITE CRUCIBLE INVESTIGATION

The final stage of the graphite crucible investigation, in which the Bureau of Mines, Washington, D. C., has been engaged for some years, has been completed. The object of this investigation was to determine the availability of domestic bond clays and domestic graphites for crucible making. During the war the obtaining of graphite and bond clays, which had been practically all imported, for making crucibles became a most serious problem. The bureau's investigations have shown that some American graphites and bond clays are, when properly prepared, equal or superior to foreign materials, for crucibles both in brass-making and in steel melting.

## ADVANTAGES OF A METAL EXCHANGE

Briefly stated the advantages of an active Metal Exchange may be summarized as follows:

1. It will remove uncertainty as to prices.
2. It will supply at all times a ready market.
3. It will save time, labor and trouble for both buyers and sellers.
4. It will make metals good collateral security for loans.
5. It will make contracts liquid and convertible.
6. It will establish a fair basis for ore settlements.
7. It will furnish facilities for "hedging" and make profits insurable and losses avoidable and thus lessen the hazards at present attending the business.
8. It will standardize contracts and specifications.
9. It will stabilize prices and minimize fluctuations.
10. It will keep at home considerable business now transacted abroad, and furnish employment for American capital and American labor.—J. H. Lang, President of the New York Metal Exchange, 111 Broadway, New York, in an article in the Steel and Metal Digest for January, 1923.

## TRADE COMMISSION INVESTIGATES SELLING OF COPPER AND ZINC

A questionnaire, which has been sent by the Federal Trade Commission to some buyers of copper and zinc, reads in part as follows:

"In the case of refined copper, do you purchase your requirements on a delivered or an f. o. b. refinery basis? In instances when sales are made to you delivered, are you able to analyze the price you pay into a refinery price plus the actual freight from such refinery to your plant? Is the freight ever figured from New York or from the Atlantic seaboard rather than from the actual refining point? Is the delivery charge ever a flat amount, the same for any point in the country, regardless of the freight rate from the refinery to such point?

"How closely, in your opinion, do the quotations on refined copper at points outside New York follow the New York market? Do they follow it exactly? Are they influenced in a general way by a rise or drop at New York? Are there any copper markets in the United States which are independent of New York?

"Has it been your experience that there is a large or small range in the copper prices quoted you on the same date by various refiners? Is there ordinarily a well established price observed by the majority of producers or are you able to buy more cheaply from one producer than from another, according to the need of the individual producer for orders, or for some other reason? Have you ever been able to purchase copper at a lower price than a New York price plus the freight from New York or seaboard to your plant?

"In purchasing zinc, do you always buy on an East St. Louis basis? Have you ever been able to buy zinc at a lower price than the East St. Louis price plus the freight from East St. Louis to your plant? Will you please state how frequently you have been able to do so? To put the question specifically, is it a frequent occurrence; or does it happen only when the smelter is in need of orders; or is it a very rare thing; or does it perhaps never occur?

"When and if you are quoted an f. o. b. smelter price on zinc, do you find that such price follows the East St. Louis price very closely? Has it been your experience that it follows the East St. Louis price exactly? Would the price at a smelter in Pennsylvania, for example, or at any point at a distance from East St. Louis be apt to show variations due to local conditions and not mere reflections of the East St. Louis market? Is there, in your opinion, any zinc market in the United States which is independent of East St. Louis?

"Are the selling methods which you have described the customary ones throughout the trade?

## WESTERN ELECTRIC TO BUILD PLANT

The Western Electric Company purchased a tract of land comprising fifty-five acres on the Kearny Meadows in New Jersey, south of the Lincoln Highway, adjoining the large plants of the Federal Shipbuilding Company and the Ford Motor Company, upon which it will immediately begin the erection of factory buildings.

It is the intention of the company to establish on this tract of land an eastern factory to supplement the manufacturing operations now carried on at its Hawthorne plant in Chicago, Ill. The first operation which it expects to carry on in the new plant will be the manufacture of lead-covered telephone cable. Construction work on the first unit of the cable factory will begin at once.—New York Times.

## ANACONDA LEADS IN COPPER AND ZINC

John D. Ryan, chairman of directors, and Cornelius F. Kelley, president of the Anaconda Mining Company, have sent a letter to stockholders calling attention to the special meeting on February 26 at Anaconda, Mont., at which the stockholders will be asked to approve an increase in the capital stock and to ratify the recent acquisition of the controlling interest in the Chile Copper Company.

The capital will be increased from the present $150,000,000 to $300,000,000, or from 3,000,000 shares of $50 par value each to 6,000,000 shares of the same par value. The letter describes in detail the purposes of the issue of $100,000,000 first mortgage bonds and $50,000,000 convertible debentures. The Chile stock is understood to have cost only $77,000,000, but the balance will be used to retire outstanding Anaconda bonds, reimburse the Anaconda treasury for capital expenditures in connection with the purchase of the American Brass Company and to increase working capital. The stock increase will provide for the conversion of the debentures.

The letter states that "the Anaconda Copper Mining Company has been transformed from essentially a copper mining and producing company to an organization engaged in various lines of production and manufacture. The field of its activities has been enlarged until today it has not only the greatest capacity in the production of copper, but it is likewise, through its rolling mills department and the American Brass Company, of which it owns 99 per cent of the stock, the premier manufacturer of copper and brass products in the world. Its electrotytic plant at Great Falls produces the largest quantity of zinc of any plant in the world, and the silver content of its ores makes it one of the largest silver producers. It is likewise an important producer of gold, lead, white lead, coal, lumber and various other products. It is the only integrated organization in the non-ferrous metal business that carries through its own plants every step of production and manufacture, from the ore extracted from its mines, to the finest finished products of copper and brass."—New York Times, January 22, 1923.

## LACQUER TO REPLACE PAINT

Action by some of the leading paint and varnish manufacturing companies of the country, whereby they are seeking to develop formulas of their own for the production of lacquer for use on wood has emphasized anew the inroads being made by lacquer upon the fields hitherto considered more or less sacred to paint and varnish.

It has, in fact, been predicted that all paint and varnish products constituted in part of oxidized materials will eventually be eliminated by lacquer, which, when properly made, is declared to constitute a finishing medium far superior to any other class of such products because of the qualities possible to obtain only with such finishes.

Lacquer, it is pointed out, has all the advantages of paint and varnish products, made partially of oxidized materials, and in addition has distinct advantages of its own which supersede disadvantages of the other products. Lacquer, it is stated, will not check, it dries quickly, and can be made to produce any kind of finish desired with fewer coats than in the case of paint and varnish.—New York Evening Mail, October 23, 1922.

## METAL STOCK MARKET QUOTATIONS

| | Par | Bid | Asked |
|---|---|---|---|
| Aluminum Company of America | $100 | $490 | $520 |
| American Hardware Corporation | 100 | 48 | 50 |
| Bristol Brass | 25 | 12 | 18 |
| International Nickel, com | 25 | 14¾ | 15 |
| International Nickel, pfd | 100 | 70 | 74 |
| International Silver, com | 100 | 45 | ... |
| International Silver, pfd | 100 | 104 | ... |
| New Jersey Zinc | 100 | 168 | 171 |
| Rome Brass & Copper | 100 | 115 | ... |
| Scovill Manufacturing Co., new | ... | 150 | 160 |
| Yale & Towne Manufacturing Co., new | ... | 58 | 60 |

Corrected by J. K. Rice, Jr., Co., 36 Wall Street, New York.

## TRADE PUBLICATIONS

**Black & Decker Portable Electric Tool and Shop Equipment.**—Catalog No. 5, issued by Black & Decker Mfg. Company, Towson Heights, Baltimore, Md., describing their portable electric tools and shop equipment, including electric grinders, valve grinders, screw drivers, electric bench and pedestal grinders and electric air compressors. It is attractively illustrated.

**Metropolitan Subway and Elevated Systems.**—Bulletin No. 44,018, issued by the General Electric Company, Schenectady, N. Y. In this pamphlet are briefly described the principal characteristics of several great rapid transit systems from an electrical engineering viewpoint.

**Paxson-Colliau Cupola.**—Bulletin No. 41, issued by J. W. Paxson Company, Philadelphia Pa., containing information on the cupola melting of an iron foundry, with illustrations.

**Paxson-Colliau Cupola.**—Bulletin No. 42, issued by J. W. Paxson Company, Philadelphia, Pa., illustrating and describing their cupola fire brick.

**Borolon.**—A booklet issued by the Abrasive Company, Philadelphia, Pa. The booklet illustrates and describes Borolon—polishing grain to be used on stair treads, pavements, warehouse floors, boiler and engine rooms, dye houses, laundries, hotel kitchens, etc.

**Calido.**—A folder issued by the Electrical Alloy Company, Morristown, N. J., telling how appliance sales can be increased with Calido—resistance wire.

**Cyanegg.**—A graphic sales chart showing fluctuations of prices of sodium ozanide in the general market as compared with prices asked by Roessler & Hasslacher, for years 1910-1922, issued by the Roessler & Hasslacher Chemical Company, 709 6th Ave., N. Y.

**Whitehead Brass-Copper Monel Metal.**—A catalogue and price list, issued by Whitehead Metal Products Company, Philadelphia, Pa., which has been compiled to show the following: Sizes carried in stock, thickness in gauge and decimal parts of an inch, weight per lineal and square foot and price list extras in cents per pound and foot, of all standard sizes of brass, copper, bronze, Muntz (Yellow) metal, nickel silver and Monel metal.

**Rust—Its Cause and Prevention.**—A pamphlet issued by Oil Specialties & Supply Company, 39 Cortlandt St., New York, setting forth the merits of "Rustavoid," guaranteed to prevent rust.

**Jones Spur Gear Speed Reducers.**—Catalog No. 26, issued by the W. A. Jones Foundry & Machine Company, Chicago, Ill. An entirely new edition. The information contained therein is of exceptional value to consulting engineers, superintendents, chief engineers, master mechanics; in fact to anyone who specifies mechanical drives for factories, mills, mines or plants.

**Garnet Paper.**—A book of abrasive papers made up by H. H. Barton & Son Company, Inc., of Philadelphia, Pa. This concern manufactures the following abrasive papers and cloths: Garnet paper, American flint paper, emery paper, French emery paper, polishing paper, emery cloth, garnet and sand cloth, "electric" abrasive cloth.

**Brass Pipe Plumbing—Repair Proof.**—A booklet issued by the Copper & Brass Research Association, 25 Broadway, New York. This booklet tells the simple facts about brass pipe plumbing in the plainest possible way, so that the man or woman who pays the plumbing repair bills can quickly grasp the fundamental fact that brass pipe plumbing is a real money-saver.

**Cost Guide.**—A book published under the supervision of the Plywood Manufacturers' Association, 1215 Monadnock building, Chicago, Ill., giving standard costing principles and practices for the plywood industry. The principles and rules offered are such as can be adopted by members whose bookkeeping and accounting facilities are necessarily limited, as well as by firms maintaining elaborate systems for cost determination. It was compiled by H. D. Potter and W. L. Churchill.

# Review of the Wrought Metal Market

**Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.**

The activity and tendancy toward advancing prices in brass and copper materials which marked the close of 1922, has continued during January. As the month ends, there is a distinct tendancy toward still higher prices, and, as a matter of fact, some definite advances in fabricated brass and copper have already been put into effect. There are very definite probabilities that there will be still further advances in the prices in the early part of February. The price of ingot copper has been working toward a higher level, with the feeling in the trade, that the end of this upward movement has not yet been seen.

There are many reasons for the improvement in the market, chief of which, however, is the enormous demand which has existed for almost a year and which seems to be continually increasing. All of the mills report full order books and most of them state that their capacity for the next two to three months, at least, and some beyond that period, has been completely sold. The reports are to the effect that the greatest demand has come for copper wire, sheet copper, sheet brass and brass rods. There has, however, been a very heavy consumption of brass pipe for plumbing work and brass condenser tubes in engineering work.

With the improvement of facilites for the production of Monel Metal in sheets, rods, tubes and wire, there has come an increased demand, so that there is still more or less difficulty attached to getting prompt shipments of these materials.

There appears to be no question that the various advertising campaigns which have been carried forward in behalf of brass, copper, monel metal and nickel are all producing results. There has been developed a demand for a higher class of material for use in construction and engineering work and the advertising work which has been carried on has placed the merit of these metals before the public in such a manner as to make possible an intelligent selection on the part of the buyer of the metal which will give the best results as to economy and durability in the particular work to which it will be applied.

# Metal Market Review

**Written for The Metal Industry by METAL MAN**

## COPPER

Market movements in copper were in limited volume during the first three weeks of January, but fresh inquiries appeared recently and these were followed by substantial sales. A firmer tone prevails in both domestic and foreign circles, and this fact proved an incentive for buyers to cover requirements on a liberal scale.

The copper situation is much more encouraging than it was some months ago, especially as relates to the statistical position and the accelerated rate of domestic consumption. Exports also showed a remarkable increase in 1922, with total shipments of approximately 715,000,000 pounds or over. United States consumption of refined copper last year is estimated at from 822,000,000 to 960,000,000 pounds, compared with 611,000,000 pounds in 1921.

Domestic buying the last days of January assumed large proportions. Large blocks were taken by consumers at 15 cents per pound for electrolytic deliveries in February, March and April. Market closes strong at 15c. to 15⅛c., with Lake 15⅛c. to 15¼c. The indications for further activity are promising. Brass and copper mills are heavy buyers.

## ZINC

The zinc market showed considerable fluctuating tendencies recently, but the tone stiffened on substantial buying between 7.15c. and 7.32½c. at New York and 6.80c. to 6.97½c. at East St. Louis. A good demand made its appearance lately for nearby shipment, but buyers are cautious about going heavily into distant futures at the current level of values.

A stringency in zinc metal stocks has provided the basis for firm market prices, but with increasing output at primary sources supplies should be in larger volume in 1923. There has been a good export demand for zinc and Europe is likely to draw on United States supplies for months to come. Surplus tonnage available for next 60 days in this country is decidedly limited, and while present conditions prevail the market is expected to reflect fair stability, at least.

## TIN

A predicted price of 40 cents per pound for tin has made itself apparent. This price has been paid for spot Straits, and there are those who expect the advancing trend to continue, providing pending plans succeed.

The world's total supplies of tin during 1922 were 118,870 gross tons, an increase of 38,210 tons as compared with supplies in 1921. Shipments from the Straits Settlements last year were 62,800 tons, against 36,100 tons during the previous year. Bolivian shipments increased 9,300 tons in 1922, and there was a small increase in shipments from China, Africa and Batavia.

The total world's deliveries in 1922 are returned at 119,160 tons, as compared with 74,996 tons in 1921. Deliveries in the United States were figured at 66,640 tons, an increase of 31,941 tons over 1921 deliveries. American deliveries were the largest since 1918, when they amounted to 68,193 tons, being the highest on record.

## LEAD

Lead is in a very strong statistical position, and the market trend has been one prolonged upward climb for more than a year. Demand is steadily increasing. New sources of supply are not keeping pace with the growth of world consumption. The significant thing is that higher prices are not retarding consumption.

Prompt shipment quotes 8.15c. to 8.25c., and in some quarters a higher figure is named. Lead ore has risen to $102. Another advance in price appears probable. East St. Louis is quoted at 8.15c.

## ALUMINUM

There is a fair demand for aluminum for manufacturing purposes and sales of ingot are reported at 23c. to 23½c. for 99% plus and at 22½c. to 23c. for 98% to 99% at New York. Domestic consumption appears to be increasing over the 1922 rate. The Aluminum Company of America are not quoting prices for publication, but they are taking care of the current needs of regular customers at private terms for all specifications. Importers are filling in particular requirements for ingot metal in moderate quantities. Foreign material is quoted as high as 24c. to 25c. for 99% fine and 23c. to 24c. for 98-99% analysis.

## ANTIMONY

Native interest in antimony revived a few weeks ago, inquiries increased and sales of Chinese material expanded in volume as prices began to advance on actual business. Offerings of round shipments from the Orient were taken up with eagerness all the way from 6.35c. to 7c., duty paid. Spot supplies have been pretty well absorbed and holders are inclined to mark up prices on shipments from China within next 30 to 60 days. Importers are not inclined to offer Chinese regulars below 5c., c. i. f. New York, in

bond. Demand is expanding and after liberal sales holders in the Far East are waiting for higher prices. There are substantial quantities available for shipment from China.

### QUICKSILVER

Dealings in quicksilver are on a restricted scale at $72 to $73 for small quantities and $71 per flask for round lots. Large shipments are expected to arrive here within the next 30 and 60 days. Spanish dealers are active competitors with London and Italy for orders, and with an open Spanish market the entire international situation is more advantageous for buyers. English buyers are reported to have bought 2,000 flasks from Spain during the last half of January.

### PLATINUM

Recent sales of platinum were more frequent in small quantities at $110 per ounce for refined metal. Crude platinum quotes $108 to $110. A few weeks ago prices were firmer in a more active demand. According to official estimates, there were about 200,000 ounces of platinum metals available for consumption in 1922. Stocks at the beginning of this year were figured at 64,547 ounces, which is considered about normal. Madrid advices report that an engineer appointed by the Spanish government had discovered in the Sierra De Ronda mountains in southern Spain, beds of platinum of a yield 12 times as great as those of Russian Ural.

### SILVER

A stronger Chinese demand and London buying were recent features in the market for silver bullion. The partial recoining of English silver coin at a lower standard has saved considerable quantities of the metal which has gone to certain institutions in special need of the metal.

There is increasing and widespread interest as to future developments when United States purchasers of silver terminate under the terms of the Pittman Act. Senator Pittman has recently expressed the belief that American silver will never again go below $1 an ounce. His opinion is based on the facts of small production, great demand, inevitable increase in demand with growth of industry and commerce in China, India and South America, and expectation of American organization that will control world marketing in silver. The remainder of amount to be purchased by United States under the Pittman Act amounts to 55,489,980 ounces. According to present indications, Treasury purchases of domestic silver will be concluded by the end of this year. Unless some artificial support is given to silver, there is much likelihood that the price of silver will decline when United States Government buying ends. But if demand from the Orient increases greatly in the meantime, the Senator's prediction may come true.

### OLD METALS

A fair degree of activity was maintained in the market for scrap metals during the past month. Price fluctuations were narrow, except for the lead scraps and alloys. These advanced sharply in sympathy with the extraordinary rise in the price of pig lead. Copper scrap was quiet and rather easy for some time, but the tone is firmer again, as new ingot prices have resumed an upward trend. Dealers are expecting more active trading in the copper and lead scraps, as these are the favorites picked for further market improvement. Buying prices are quoted at 12⅜c. to 12½c. for standard crucibled copper, 10½c. to 10¾c. for light copper, heavy brass 6½c. to 6⅞c., new brass clippings 8⅞c. to 9c., heavy lead 6½c. to 6¾c., new zinc scrap 5c. to 5¼c., and battery lead 3⅞c. to 4⅛c. Aluminum clippings quote 16c. to 16½c.

## WATERBURY AVERAGE

Lake Copper—Average for 1922, 13.844—January, 1923, 14.875.
Brass Mill Zinc—Average for 1922, 6.283—January, 1923, 8.

# Daily Metal Prices for the Month of January, 1923

## Record of Daily, Highest, Lowest and Average

### Metal Prices for February 2, 1923

| Date | 1 | 2 | 3 | 4 | 5 | 8 | 9 | 10 | 11 | 12 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Holiday | | | | | | | | | | | | | |
| **Copper** (f. o. b., Ref.) c/lb. Duty Free: | | | | | | | | | | | | | | |
| Lake (Delivered) | .... | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Electrolytic | .... | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.625 | 14.60 |
| Casting | .... | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 |
| **Zinc** (f. o. b., St. L.) c/lb. Duty 1¼c/lb. | | | | | | | | | | | | | | |
| Prime Western | .... | 7.05 | 7.05 | 7.05 | 7.05 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 6.95 | 6.95 | 6.90 | 6.85 |
| Brass Special | .... | 7.15 | 7.15 | 7.15 | 7.15 | 7.10 | 7.10 | 7.10 | 7.10 | 7.10 | 7.05 | 6.95 | 7.00 | 6.95 |
| **Tin** (f. o b., N. Y.) c/lb. Duty Free: | | | | | | | | | | | | | | |
| Straits | .... | 39.00 | 38.60 | 38.35 | 38.25 | 38.35 | 38.25 | 38.50 | 39.125 | 39.25 | 39.00 | 38.875 | 38.625 | 38.50 |
| Pig 99% | .... | 37.75 | 37.375 | 37.125 | 37.00 | 37.125 | 37.00 | 37.25 | 37.75 | 38.25 | 37.75 | 37.75 | 37.625 | 37.50 |
| **Lead** (f. o. b., St. L.) c/lb. Duty 2½c/lb. | .... | 7.10 | 7.15 | 7.20 | 7.25 | 7.30 | 7.30 | 7.40 | 7.50 | 7.60 | 7.60 | 7.60 | 7.65 | 7.65 |
| **Aluminum** c/lb. Duty 5c/lb. | .... | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | | | |
| Ingot—Internat. Nick. Co. | .... | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Outside Spot | .... | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 | 32-4 |
| Electrolytic (Internat. Nick. Co.) | .... | | | | | | | | | | | | | |
| Ni.—99.80 contam. impur.—14 | .... | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 |
| Brit.-Amer. Nick. Corp. | .... | | | | | | | | | | | | | |
| Ni.—98.50 contam. impur.—.80 | .... | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| **Antimony** (J. & Ch.) c/lb. Duty 2c/lb. | .... | 6.30 | 6.35 | 6.45 | 6.60 | 6.60 | 6.60 | 6.625 | 6.75 | 6.75 | 6.75 | 6.85 | 6.85 | 6.85 |
| **Silver** (foreign) c/oz. Duty Free | .... | 64.50 | 64.625 | 66.37 | 65.125 | 66.00 | 65.625 | 64.375 | 65.125 | 65.375 | 67.125 | 66.75 | 65.50 | 65.50 |
| **Platinum** $/oz. Duty Free | .... | 118 | 118 | 118 | 118 | 118 | 118 | 118 | 118 | 118 | 110 | 110 | 110 | 110 |

| Date | 19 | 22 | 23 | 24 | 25 | 26 | 29 | 30 | 31 | High | Low | Aver. | Feb. 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Holiday | | | | | | | | | | | | |
| **Copper** (f. o. b., Ref.) c/lb. Duty Free: | | | | | | | | | | | | | |
| Lake (Delivered) | .... | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.125 | 15.125 | 15.125 | 15.125 | 15.00 | 15.017 | 15.125 |
| Electrolytic | .... | 14.60 | 14.60 | 14.625 | 14.625 | 14.70 | 14.75 | 14.875 | 14.875 | 14.875 | 14.875 | 14.60 | 14.664 | 14.90 |
| Casting | .... | 14.25 | 14.25 | 14.35 | 14.35 | 14.35 | 14.40 | 14.50 | 14.50 | 14.50 | 14.50 | 14.00 | 14.304 | 14.50 |
| **Zinc** (f. o. b., St. L.) c/lb. Duty 1¼c/lb. | | | | | | | | | | | | | | |
| Prime Western | .... | 6.80 | 6.80 | 6.80 | 6.80 | 6.85 | 6.95 | 7.05 | 7.15 | 7.10 | 7.15 | 6.80 | 6.961 | 7.05 |
| Brass Special | .... | 6.90 | 6.90 | 6.90 | 6.90 | 6.95 | 7.05 | 7.15 | 7.25 | 7.20 | 7.25 | 6.90 | 7.056 | 7.15 |
| **Tin** (f. o b., N. Y.) c/lb. Duty Free: | | | | | | | | | | | | | | |
| Straits | .... | 38.875 | 39.375 | 40.00 | 40.00 | 39.875 | 40.125 | 40.50 | 40.50 | 40.00 | 40.50 | 38.25 | 39.178 | 39.875 |
| Pig 99% | .... | 38.00 | 38.625 | 39.00 | 39.00 | 39.00 | 39.125 | 39.50 | 39.25 | 38.75 | 39.50 | 37.00 | 37.613 | 38.875 |
| **Lead** (f. o. b., St. L.) c/lb. Duty 2½c/lb. | .... | 7.65 | 7.65 | 7.90 | 8.00 | 8.00 | 8.05 | 8.15 | 8.15 | 8.15 | 8.15 | 7.10 | 7.636 | 8.15 |
| **Aluminum** c/lb. Duty 5c/lb. | .... | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | | | |
| Ingot—Internat. Nick. Co. | .... | 36 | 36 | 36 | 36 | 29 | 29 | 29 | 29 | 29 | 36 | 29 | 34.409 | 29 |
| Outside Spot | .... | 32-4 | 32-4 | 32-4 | 32-4 | 29 | 29 | 29 | 29 | 29 | 34 | 29 | 32.090 | 29 |
| Electrolytic (Internat. Nick. Co.) | .... | | | | | | | | | | | | | |
| Ni.—99.80 contam. impur.—14 | .... | 39 | 39 | 39 | 39 | 32 | 32 | 32 | 32 | 32 | 39 | 32 | 37.409 | 32 |
| Brit.-Amer. Nick. Corp. | .... | | | | | | | | | | | | | |
| Ni.—98.50 contam. impur.—.80 | .... | 33 | 33 | 33 | 33 | 29 | 29 | 29 | 29 | 29 | 33 | 29 | 32.090 | 29 |
| **Antimony** (J. & Ch.) c/lb. Duty 2c/lb. | .... | 6.85 | 7.00 | 7.00 | 7.00 | 7.125 | 7.125 | 7.125 | 7.125 | 7.125 | 7.125 | 6.30 | 6.809 | 7.125 |
| **Silver** (foreign) c/oz. Duty Free | .... | 65.375 | 66.00 | 66.50 | 67.125 | 66.50 | 66.125 | 64.875 | 65.125 | 64.75 | 67.125 | 64.375 | 65.653 | 64 |
| **Platinum** $/oz. Duty Free | .... | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 118 | 110 | 113.272 | 114 |

# Metal Prices, February 5, 1923

## INGOT METALS AND ALLOYS

| | | | | |
|---|---|---|---|---|
| Brass Ingot, Yellow | " | " | " | 10½to12 |
| Brass Ingots, Red | " | " | " | 13 to14½ |
| Bronze Ingot | " | " | " | 13 to15¼ |
| Bismuth | | | | $2.70-2.75 |
| Cadmium | | | | $1.15 |
| Casting Aluminum Alloys | " | " | " | 21 to24 |
| Cobalt—97% pure | | | | $2.75-2.85 |
| Manganese Bronze Castings | " | " | " | 21 to33 |
| Manganese Bronze Ingots | " | " | " | 12 to16½ |
| Manganese Bronze Forging | " | " | " | 30 to40 |
| Manganese Copper, 30% | " | " | " | 28 to45 |
| Magnesium Metal | | | | $1.25-1.50 |
| Parsons Manganese Bronze Ingots | " | " | " | 18½to20 |
| Phosphor Bronze | " | " | " | 24 to30 |
| Phosphor Copper, guaranteed 15% | " | " | " | 18 to23 |
| Phosphor Copper, guaranteed 10% | " | " | " | 17½to22½ |
| Phosphor Tin, guarantee 5% | " | " | " | 48 to58 |
| Phosphor Tin, no guarantee | " | " | " | 46 to56 |
| Quicksilver | | | | $72 |
| Silicon Copper, 10% | according to quantity | | | 28 to35 |

## OLD METALS

| Buying Prices | | Selling Prices |
|---|---|---|
| 12¼to12¾ | Heavy Cut Copper | 13¾to14¼ |
| 12 to12¼ | Copper Wire | 13¼to13¾ |
| 10¾to11 | Light Copper | 11¾to12 |
| 10 to10¼ | Heavy Machine Comp | 11½to12 |
| 7 to 7¼ | Heavy Brass | 8¾to 9 |
| 6 to 6¼ | Light Brass | 7½to 7¾ |
| 7 to 7¼ | No. 1 Yellow Brass Turnings | 8¼to 8¾ |
| 9 to 9¼ | No. 1 Comp Turnings | 10½to11 |
| 6 to 6¼ | Heavy Lead | 6¾to 7 |
| 4½ | Zinc Scrap | 5 to 5¼ |
| 9 to 9½ | Scrap Aluminum, Turnings | 11½to12½ |
| 15 to15½ | Scrap Aluminum, cast alloyed | 16½to17½ |
| 16 to17 | Scrap Aluminum, sheet (new) | 18½to20 |
| 20 | No. 1 Pewter | 24 |
| 15 | Old Nickel anodes | 17 |
| 23 to25 | Old Nickel | 27 to29½ |

## BRASS MATERIAL—MILL SHIPMENTS

In effect January 31, 1923
To customers who buy 5,000 lbs. or more in one order.

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass | Low Brass | Bronze |
| Sheet | $0.19¼ | $0.20⅞ | $0.22½ |
| Wire | 0.19¾ | 0.21⅜ | 0.23 |
| Rod | 0.17½ | 0.21⅝ | 0.23¼ |
| Brazed tubing | 0.26¼ | ..... | 0.31¼ |
| Open Seam tubing | 0.26¼ | ..... | 0.31¼ |
| Angles and channels | 0.29¼ | ..... | 0.34¼ |

To customers who buy less than 5,000 lbs. in one order

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass | Low Brass | Bronze |
| Sheet | $0.20¼ | $0.21⅞ | $0.23½ |
| Wire | 0.20¾ | 0.22¾ | 0.24 |
| Rod | 0.18½ | 0.22⅝ | 0.24¼ |
| Brazed tubing | 0.27¼ | ..... | 0.32¼ |
| Open seam tubing | 0.27¼ | ..... | 0.32¼ |
| Angles and channels | 0.30¼ | ..... | 0.35¼ |

## SEAMLESS TUBING

Brass, 23½c. to 24½c. per lb. base.
Copper, 25¼c. to 26¼c. per lb. base.

## TOBIN BRONZE AND MUNTZ METAL

| | |
|---|---|
| Tobin Bronze Rod | 21¼c. net base |
| Muntz or Yellow Metal Sheathing (14"x48") | 19¼c. net base |
| Muntz or Yellow Rectangular Sheets other than Sheathing | 20¼c. net base |
| Muntz or Yellow Metal Rod | 17¼c. net base |

Above are for 100 lbs. or more in one order.

## COPPER SHEET

| | |
|---|---|
| Mill shipments (hot rolled) | 22½c. to 23½c. |
| From stock | 23½c. to 24½c. |

## BARE COPPER WIRE—CARLOAD LOTS

17¼c. to 17½c. per lb. base.

## SOLDERING COPPERS

| | |
|---|---|
| 300 lbs. and over in one order | 20¾c. per lb. base |
| 100 lbs. to 200 lbs. in one order | 21¼c. per lb. base |

## ZINC SHEET

Duty, sheet, 15%. Cents per lb.
Carload lots, standard sizes and gauges, at mill, 9c. to 9½c. basis less 8 per cent. discount.

| | |
|---|---|
| Casks, jobbers' prices | 10c. to 10¾c. |
| Open casks, jobbers' prices | 10¾c. to 11¾c. |

## ALUMINUM SHEET AND COIL

| | |
|---|---|
| Aluminum sheet, 18 ga. and heavier, base price | 36c. |
| Aluminum coils, 24 ga. and heavier, base price | 33c. |
| Foreign | 42c. |

## NICKEL SILVER (NICKELENE)

Base Prices
Grade "A" Nickel Silver Sheet Metal

| | | | |
|---|---|---|---|
| 10% | Quality | 26½c. | per lb. |
| 15% | " | 28c. | " " |
| 18% | " | 29c. | " " |

Nickel Silver Wire and Rod

| | | | |
|---|---|---|---|
| 10% | " | 29½c. | " " |
| 15% | " | 33c. | " " |
| 18% | " | 36c. | " " |

## MONEL METAL

| | |
|---|---|
| Shot | 32 |
| Blocks | 32 |
| Hot Rolled Rods (base) | 40 |
| Cold Drawn Rods (base) | 46 |
| Hot Rolled Sheets (base) | 45 |

## BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

## SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 68c. to 71c. per Troy ounce, depending upon quantity.

Rolled sterling silver 68c. to 70c.

## NICKEL ANODES

| | |
|---|---|
| 85 to 87% purity | 31½c.-32c. per lb. |
| 90 to 92% purity | 34c. -35c. per lb. |
| 95 to 97% purity | 36c. -37c. per lb. |

# Supply Prices, February 5, 1923

## CHEMICALS

In Commercial Quantities—New York Prices

| | | |
|---|---|---|
| Acetone | lb. | .22-.24 |
| Acid— | | |
| Boric (Boracic) Crystals | lb. | .12 |
| Hydrochloric (Muriatic) Tech., 20 deg., Carboys | lb. | .02 |
| Hydrochloric, C. P., 20 deg., Carboys | lb. | .08 |
| Hydrofluoric, 30%, bbls. | lb. | .08 |
| Nitric, 36 deg. Carboys | lb. | .06 |
| Nitric, 42 deg. Carboys | lb. | .07 |
| Sulphuric, 66 deg. Carboys | lb. | .02 |
| Alcohol— | | |
| Butyl | lb. | .22-.25 |
| Denatured in bbls. | gal. | .36-.43 |
| Alum— | | |
| Lump, Barrels | lb. | .04 |
| Powdered, Barrels | lb. | .04½ |
| Aluminum sulphate, commercial tech | lb. | .02½-.03 |
| Aluminum chloride solution | lb. | .22 |
| Ammonium— | | |
| Sulphate, tech., Barrels | lb. | .03¾ |
| Sulphocyanide | lb. | .65 |
| Argols, white, see Cream of Tartar | lb. | .27 |
| Arsenic, white, Kegs | lb. | .16 |
| Asphaltum | lb. | .35 |
| Benzol, pure | gal. | .60 |
| Blue Vitriol, see Copper Sulphate. | | |
| Borax Crystals (Sodium Biborate), Barrels | lb. | .06 |
| Calcium Carbonate (Precipitated Chalk) | lb. | .04 |
| Carbon Bisulphide, Drums | lb. | .07 |
| Chrome Green | lb. | .36 |
| Cobalt Chloride | lb. | — |
| Copper— | | |
| Acetate | lb. | .37 |
| Carbonate, Barrels | lb. | .19 |
| Cyanide | lb. | .46 |
| Sulphate, Barrels | lb. | .06½ |
| Copperas (Iron Sulphate, bbl.) | lb. | .02 |
| Corrosive Sublimate, see Mercury Bichloride. | | |
| Cream of Tartar, Crystals (Potassium bitartrate) | lb. | .27 |
| Crocus | lb. | .15 |
| Dextrin | lb. | .05-.08 |
| Emery Flour | lb. | .06 |
| Flint, powdered | ton | $30.00 |
| Fluor-spar (Calcic fluoride) | ton | $75.00 |
| Fusel Oil | gal | 3.10 |
| Gold Chloride | oz. | 14.00 |
| Gum— | | |
| Sandarac | lb. | .26 |
| Shellac | lb. | .82-1.00 |
| Iron, Sulphate, see Copperas, bbl | lb. | .02 |
| Lead Acetate (Sugar of Lead) | lb. | .13 |
| Yellow Oxide (Litharge) | lb. | .12½ |
| Mercury Bichloride (Corrosive Sublimate) | lb. | 1.15 |
| Nickel— | | |
| Carbonate Dry | lb. | .40 |
| Chloride, 100 lb. lots | lb. | .27½-.40 |
| Salts, single, bbls | lb. | .12 |
| Salts, double, bbl | lb. | .11 |
| Paraffin | lb. | .05-.06 |
| Phosphorus—Duty free, according to quantity | | .35-.40 |
| Potash, Caustic, Electrolytic 88-92% fused, drums | lb. | .07½ |
| Potassium Bichromate, casks | lb. | .10½ |
| Carbonate, 80-85%, casks | lb. | .06 |
| Cyanide, 165 lb. cases, 94-96% | lb. | .65 |
| Pumice, ground, bbls | lb. | .02½ |
| Quartz, powdered | ton | $30.00 |
| Official | oz. | — |
| Rosin, bbls. | lb. | .03½ |
| Rouge, nickel, 100 lb. lots | lb. | .25 |
| Silver and Gold | lb. | .65 |
| Sal Ammoniac (Ammonium Chloride) in casks | lb. | .08 |
| Silver Chloride, dry | oz. | .86 |
| Cyanide | oz. | — |
| Nitrate, 100 ounce lots | oz. | .46 |
| Soda Ash, 58%, bbls | lb. | .02½ |
| Sodium— | | |
| Biborate, see Borax (Powdered), bbls | lb. | .06 |
| Cyanide, 96 to 98%, 100 lbs | lb. | .23 |
| Hyposulphite, kegs | lb. | .04 |
| Hyposulphite, kegs | lb. | .04 |
| Nitrate, tech. bbls | lb. | .03 |
| Phosphate, tech., bbls | lb. | .03¼ |
| Silicate (Water Glass) bbls | lb. | .02 |
| Sulpho Cyanide | lb. | .45 |
| Soot, Calcined | lb. | — |
| Sugar of Lead, see Lead Acetate | lb. | .12-.13 |
| Sulphur (Brimstone) bbls | lb. | .02 |
| Tin Chloride, 100 lb. kegs | lb. | .33 |
| Tripoli | lb. | .03 |
| Verdigris, see Copper Acetate | lb. | .37 |
| Water Glass, see Sodium Silicate, bbls | lb. | .02½ |
| Wax— | | |
| Bees, white ref. bleached | lb. | .55 |
| Yellow, No. 1 | lb. | .35 |
| Whiting, Bolted | lb. | .02½-.06 |
| Zinc, Carbonate, bbls. | lb. | .13-17 |
| Chloride, 600 lb. lots | lb. | .07 |
| Cyanide | lb. | .37 |
| Sulphate, bbls. | lb. | .03¼ |

## COTTON BUFFS

Open buffs, per 100 sections (nominal).

| | | |
|---|---|---|
| 12 inch, 20 ply, 64/68, cloth | base, | 42.95 |
| 14 inch, 20 ply, 64/68, cloth | base, | 53.40 |
| 12 inch, 20 ply, 84/92, cloth | base, | 49.85 |
| 14 inch, 20 ply, 84/92, cloth | base, | 67.15 |
| 12 inch, 20 ply, 88/96, cloth | base, | 55.95 |
| 14 inch, 20 ply, 88/96, cloth | base, | 75.35 |
| Sewed Buffs, per lb., bleached and unbleached | base, | .50 |

## FELT WHEELS

| | | Price Per Lb. Less Than 100 Lbs. | 300 Lbs. and Over |
|---|---|---|---|
| Diameter—10" to 16" | 1" to 3" | 2.75 | 2.50 |
| " 6" 8" and over 16" | 1" to 3" | 2.85 | 2.60 |
| " 6" to 24" | Over 3" | 3.15 | 2.80 |
| " 6" to 24" | ½" to 1" | 3.75 | 3.50 |
| " 4" to 6" | ¼" to 3" | 4.75 } Any quantity. | |
| " Under 4" | ¼" to 3" | 5.35 } | |

Grey Mexican or French Grey—10c. less per lb. than Spanish, above. Odd sizes, 50c. advance.